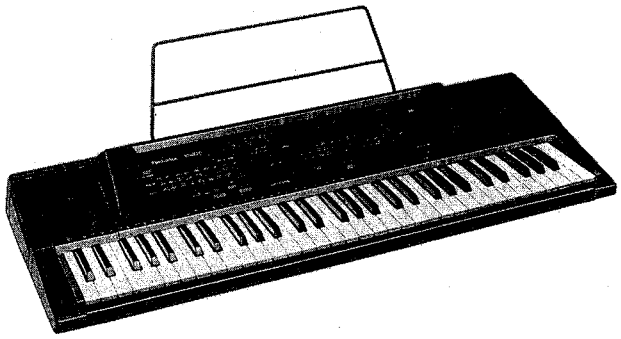
ORDER NO. EMID911347
A5 5482

Service Manual

PCM Keyboard

SX-KN220

(M), (MC), (XM), (EN), (EH), (EF), (EZ), (EW), (EA), (EP), (EK), (XL), (XR), (XS), (XD), (X)



AREAS

(M): U.S.A.	(EP): Spain, Portugal, Greece
(MC): Canada	(EK): the United Kingdom
(XM): Mexico	(XL): New Zealand
(EN): Norway, Sweden, Denmark, Finland	(XR): Australia
(EH): Holland	(XS): Malaysia, Singapore, South Africa
(EF): France, Italy, Belgium	(XD): Saudi Arabia, Kuwait
(EZ): Germany	(X): the Middle East, Indonesia, Hong Kong, the Philippines, Thailand, Taiwan
(EW): Switzerland	
(EA): Austria	

Specifications

KEYBOARD		61 KEYS (TOUCH SENSITIVE KEYBOARD)
SOUND GENERATOR		PCM
MAXIMAL NOTE NUMBER PRODUCING SIMULTANEOUSLY		11 NOTES
SOUND	POLY	PIANO 1, 2, ELECTRIC GRAND PIANO, HARPSICHORD, ELECTRIC PIANO 1, 2, GUITAR, JAZZ GUITAR, SOLID GUITAR, HAWAIIAN GUITAR, MUTE GUITAR, ROCK GUITAR, GLOCKEN, BANJO, CLAVI, XYLOPHONE, VIBETONE, KALIMBA, PIPE ORGAN 1, 2, JAZZ ORGAN 1, 2, STEEL DRUM, POP ORGAN, VIOLIN, STRINGS, SYNTH STRING, BRASS, TRUMPET, SYNTH BRASS 1, 2, FRENCH HORN, TROMBONE, ACCORDION, TENOR SAX, ALTO SAX, OBOE, CLARINET, HARMONICA, PAN FLUTE, FLUTE, WHISTLE, SPECIAL 1, 2, 3, 4, 5, 6 (WITH VARIATION FOR EACH SOUND)
EFFECT	DIGITAL CELESTE	○ (POLY)
	SUSTAIN	○ (POLY, ACCOMP 1, 2 & 3, BASS)
TRANSPOSE		○
TECHNI-CHORD		○
RHYTHM	RHYTHM SELECT	MARCH 1, 2, COUNTRY, WALTZ, SWING 1, 2, DIXIE, JAZZ WALTZ, 8 BEAT 1, 2, ROCK'N'ROLL, SHUFFLE, ROCK BALLAD, LATIN 1, 2, BOSSA NOVA, 16 BEAT 1, 2, JAZZ ROCK, FUNK, SWING ROCK, DISCO, LATIN ROCK 1, 2 (WITH VARIATION FOR EACH RHYTHM)
	CONTROL	START/STOP, SYNCHRO & BREAK, FILL IN, INTRO & ENDING, TEMPO
	KEYBOARD PERCUSSION	34 KEYS
AUTO PLAY CHORD		ONE-FINGER, FINGERED, MEMORY
ONE TOUCH PLAY		○
SEQUENCER		2 TRACKS (PART: POLY, ACCOMP/CHORD) STRAGE CAPACITY: APPROX. 1600 NOTES INPUT MODE: REAL TIME, STEP (ACCOMP/CHORD ONLY)
DISPLAY		○
DEMO		○
CONTROL		BALANCE, SUB BALANCE/MIDI
MIDI		PART (POLY, BASS, ACCOMP 1, 2, 3, DRUMS, CONTROL), BASIC CHANNEL (1~16), RECEIVE MODE, TRANSMIT MODE, LOCAL CONTROL, PROGRAM CHANGE, NOTE ONLY, MIDI CLOCK, START/STOP
TERMINALS		HEADPHONE TERMINAL, LINE OUT (R/R+L), MIDI TERMINAL (IN, OUT), FOOT SWITCH
OTHERS		PLAY SWITCH, MAIN VOLUME
OUTPUT		2.5W×2
SPEAKERS		12cm×2
POWER REQUIREMENT		9~12V DC (WITH EXCLUSIVE AC ADAPTOR SY-AD1)
DIMENSIONS (W×H×D)		95.1cm×14.7cm×36.6cm (37-7/16″×5-25/32″×14-13/32″)
NET WEIGHT		8.0kg (17.6lbs)
ACCESSORIES		MUSIC STAND, AC ADAPTOR

Technics

5482

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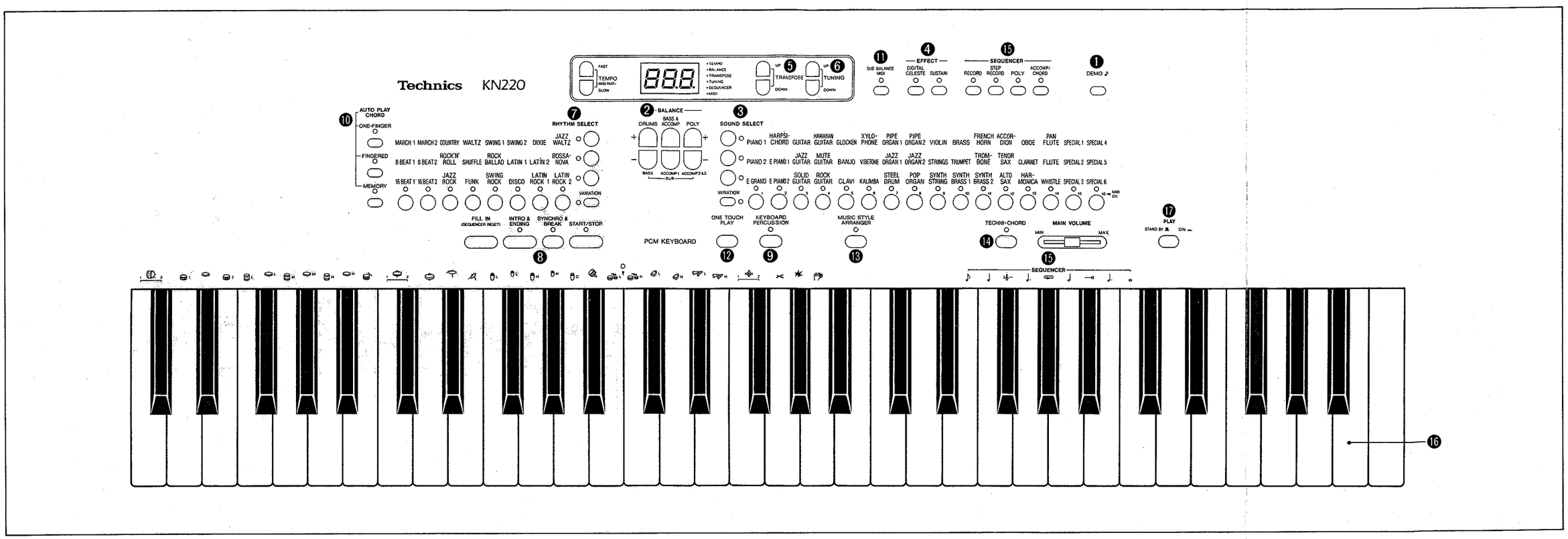
ARRANGEMENT OF CONTROL PANEL



❶ DEMO
Eighteen pre-recorded performances are used to demonstrate the individual appeal of each basic rhythm and sound.

❷ BALANCE
The volumes for the **DRUMS, BASS & ACCOMP, POLY** parts are adjusted with their respective **BALANCE** controls. There are 10 volume levels to select from.

❸ SOUND SELECT
Choose from 48 **POLY** sounds with the **SOUND SELECT** matrix. A **VARIATION** is available for each sound, providing a different nuance to the sound.

❹ EFFECT
DIGITAL CELESTE gives the sound a thickness and diffusion; **SUSTAIN** is a gradual fading out of the musical tones.

❺ TRANSPOSE
C is the standard setting, but you can raise or lower the key of the entire keyboard in semi-tone steps across an entire octave.

❻ TUNING
The tuning controls allow you to fine-tune the pitch of the entire instrument. The adjustable range is 427.3 Hz to 453 Hz. Selectable decimals are 0.2, 0.6 and 1.0 Hz.

❼ RHYTHM SELECT
Select from 24 preset rhythms in the **RHYTHM SELECT** matrix. A **VARIATION** is also available for each rhythm.

❽ Rhythm control
Use the **FILL IN** button to insert a fill-in pattern during the rhythm performance.
The **INTRO & ENDING** button is used to start a song with an intro pattern or to finish with an ending pattern. When the **SYNCHRO & BREAK** button is on, the rhythm is started by pressing any key to the left of the indicated keyboard split point.
START/STOP is used to start and stop the rhythm instantly.

❾ KEYBOARD PERCUSSION
Press the **KEYBOARD PERCUSSION** button to transform your keyboard into a whole band of percussive instruments and special sounds. The keys are picture-coded for quick and easy selection.

❿ AUTO PLAY CHORD
This feature is activated when the **ONE FINGER** or **FINGERED** button is turned on. When you play a chord on the keyboard, an accompaniment pattern which matches the selected rhythm is automatically produced. If the **MEMORY** button is on, even if you release the keys, the accompaniment pattern continues to play in the specified chord until you play another chord.

⓫ SUB BALANCE/MIDI
The total accompaniment volume is adjusted with the **BASS & ACCOMP** buttons in the **BALANCE** section. By turning on the **SUB BALANCE/MIDI** button, however, you can adjust the volumes of the **BASS, ACCOMP 1** and **ACCOMP 2&3** parts independently.

⓬ ONE TOUCH PLAY
With this special feature, you select a rhythm, and appropriate sounds and effects are automatically set.

⓭ MUSIC STYLE ARRANGER
Each time the **FILL IN** button is pressed while the rhythm pattern is playing, the sounds and effects change.

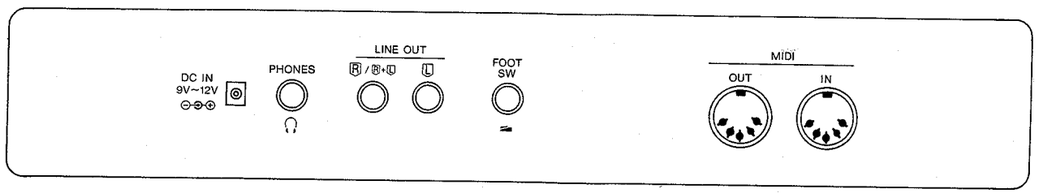
⓮ TECHNI-CHORD
When the **AUTO PLAY CHORD** is used, a block chord is produced for each single melody note played.

⓯ SEQUENCER
Store a chord progression for a tune, or record your entire performance—melody, accompaniment, panel settings and changes—in the **SEQUENCER** memory for automatic playback.

⓰ KEYBOARD
Up to 11 notes can be produced at the same time. Depending on the selected sound, the number of notes which can be produced simultaneously may decrease.

⓱ PLAY
When the keyboard is turned off, all of the stored memories of the **SEQUENCER**, and settings for MIDI, the foot switch, etc. are erased and return to their factory-preset (initialized) status.

OPTIONS AND CONNECTIONS



■ CONNECTIONS

DC IN 9V~12V
Connect the exclusive AC adaptor to this terminal.

PHONES (∩) (Use headphones with over 16Ω impedance.)
For silent practice headphones may be used. When plugged in, the speaker system is automatically switched off, and sound is heard only through the headphones.

LINE OUT (Output level 1.5Vrms, 600Ω)
By plugging into the Technics Keyboard Amp or a high-power amplifier the sound can be reproduced at high volume. (Use the **R/R+L** terminal when outputting monaural sound.)

FOOT SW
When an SZ-P1 Foot Switch is connected to this terminal, you can choose from among several functions to control by foot.

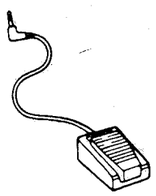
MIDI (Musical Instrument Digital Interface)
MIDI is standard specification that enables connection to equipment such as synthesizers and personal computers. Data transmission and reception are possible between the Technics Digital Keyboard instruments provided with MIDI terminals.

IN: The terminal that receivers data from external equipment.

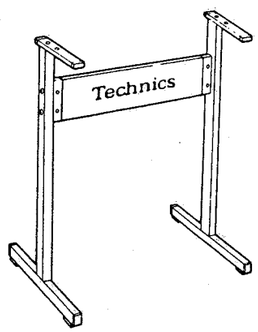
OUT: The terminal that transmits data from this equipment to external equipment.

- Use a 5-pin DIN cord (less than 15m long) for these connections.

■ OPTIONS

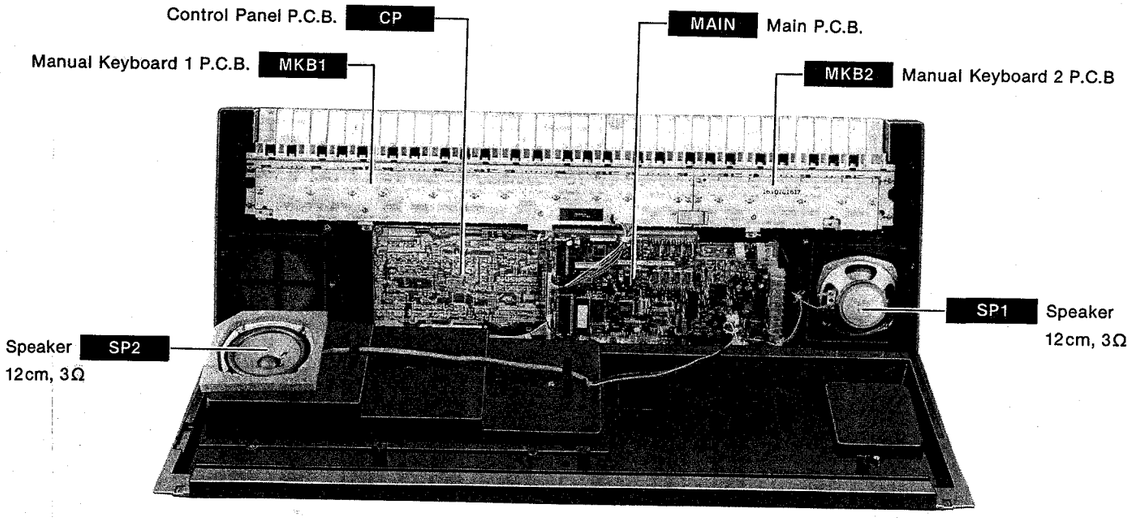


SZ-P1
(Foot Switch)



SZ-S61
(Keyboard Stand)

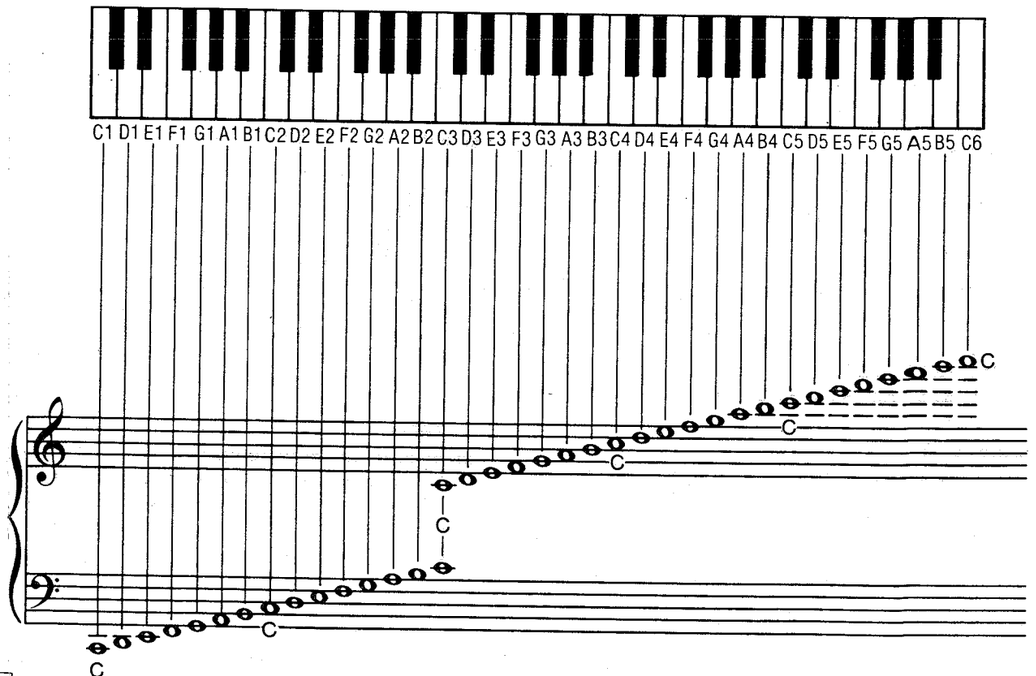
PARTS LOCATION



[Photo-1]

KEYBOARD RANGES

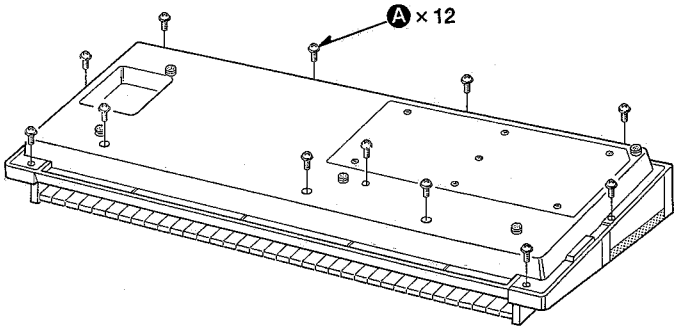
- This keyboard features Touch Response, by which you control the volume by playing the keys harder or softer.



DISASSEMBLY INSTRUCTIONS

[1] Opening the Cabinet.

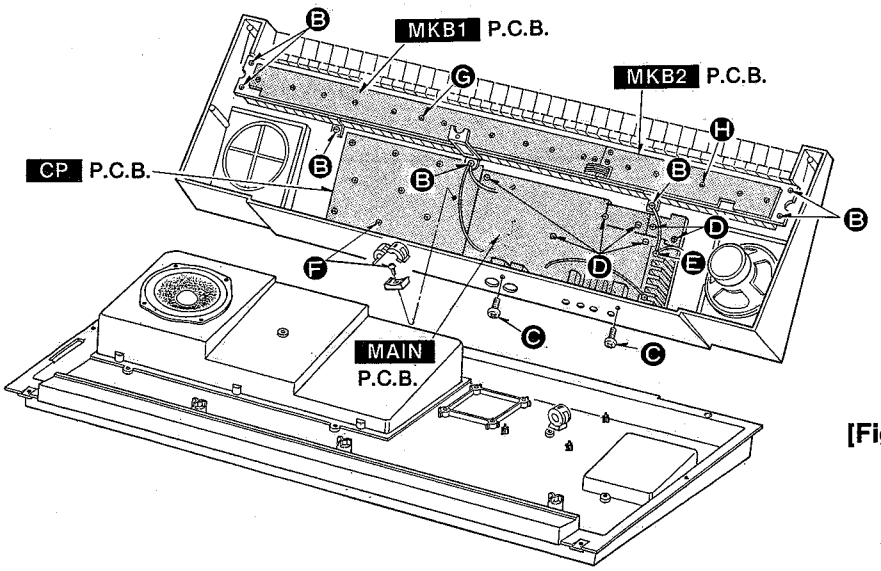
1. Turn the keyboard cabinet upside down as shown in Fig. 1, and remove the bottom screws. (Ⓐ 12pcs.)
2. Place the keyboard bottomside down, and open the top cabinet.



[Fig. 1]

[2] Removing the Keyboard assembly

1. Open the cabinet. (See Step 1)
2. Remove the keyboard assembly holding screws. (Ⓑ 7pcs.)



[Fig. 2]

[3] Removing the Printed Circuit Boards

MAIN P.C.B.

1. Open the cabinet and pull out the connector on the MAIN P.C.B.
2. Remove the MAIN P.C.B. mounting screws on the rear panel. (Ⓒ 2pcs.)
3. Remove the MAIN P.C.B. mounting screws. (Ⓓ 7pcs.)
4. Remove the wire mounting screw. (Ⓑ 1pcs. and Ⓔ 1pcs.)

CP P.C.B.

1. Open the cabinet and pull out the connector on the CP P.C.B.
2. Remove the MAIN P.C.B. (See Step 3)
3. Remove the CP P.C.B. mounting screws. (Ⓔ 19pcs.)

MKB1 P.C.B.

1. Open the cabinet. (See Step 1)
2. Remove the flat cable connector between the MKB1 and MKB2 P.C.B.
3. Remove the MKB1 P.C.B. mounting screws. (Ⓖ 12pcs.)

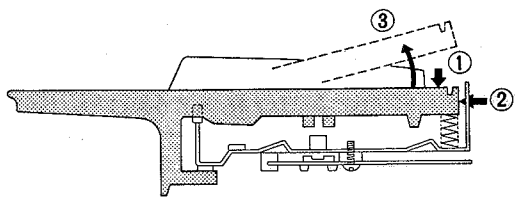
MKB2 P.C.B.

1. Open the cabinet. (See Step 1)
2. Remove the flat cable connector between the MKB1 and MKB2 P.C.B.
3. Remove the MKB2 P.C.B. mounting screws. (Ⓗ 7pcs.)

[4] Removing the Key(s)

1. Remove the keyboard assembly. (See Step 2)
2. Press the rear of the key downward. (Fig. 3-①)
3. Push the rear edge of the key while the rear of the key in downward. (Fig. 3-②)
4. To remove the key, lift it as shown Fig. 3-③ direction.

NOTE:
If a black key is be replaced it is necessary to remove both adjacent white keys.



[Fig. 3]

MEASUREMENTS AND ADJUSTMENTS

■ Measuring Equipment

• Oscilloscope 20MHz, 1: 1 probe

ADJUSTMENT	MEASURING CONDITIONS	EQUIPMENT	ADJUSTMENT P.C.B.	ADJ. POINT	CONNECT POINT(S)	READING
DAC bias 1	any position	Oscilloscope	MAIN P.C.B.	VR1	Check Point ❾, ❿	0V±1mV
	1. Set the oscilloscope voltage division 2mV/cm (use 1: 1 oscilloscope probe). 2. Connect an oscilloscope probes to each check point ❾ (⊕ probe) and check point ❿ (⊖ probe). 3. Turn the VR1 to adjust the voltage to Zero.					
DAC bias 2	any position	Oscilloscope	MAIN P.C.B.	VR2	Check Point ⓫, ❿	0V±1mV
	1. Set the oscilloscope voltage division 2mV/cm (use 1: 1 oscilloscope probe). 2. Connect an oscilloscope probes to each check point ⓫ (⊕ probe) and check point ❿ (⊖ probe). 3. Turn the VR2 to adjust the voltage to Zero.					

SYMPTOMS WHICH APPEAR TO BE SIGNS OF TROUBLE

The following changes in performance may occur in the Technics Keyboard but do not indicate trouble:

Phenomenon	Remedy
■ Sounds and effects	
The buttons, keys, etc. malfunction.	• Turn off the **PLAY** button once, then turn it on again. All settings return to their factory-preset (initialized) status.
No sound is produced when the keys are pressed.	• The **MAIN VOLUME** is at the minimum setting. Adjust the volume with the **MAIN VOLUME** control. • The **DEMO** ♪ button is on, and − − − is shown on the display. Press the **DEMO** ♪ button to turn it off. The display returns to the tempo display. • The **BALANCE** volumes are set to 0. Press the **POLY** (+) button in the **BALANCE** section to adjust the volume. • The local control for a part performed on the keyboard is set to off. Set the local control to on.
When many keys are pressed at the same time, not all of them sound.	• Up to 11 notes can be produced simultaneously. The number of notes which can be produced simultaneously may decrease depending on the selected sound, the **DIGITAL CELESTE** status, etc.
CONDUCTOR, AUTO PLAY CHORD do not work.	• The MIDI receive mode is set to the multi mode. Set the receive mode to the single mode.
The highest note of the **SOLID GUITAR** sound is strange.	• This is not a malfunction. When the **SOLID GUITAR** sound (**VARIATION** on) is assigned to the **POLY** part, or when the **SPECIAL 6** sound is assigned to the **ACCOMP PART**, the highest played note for that part becomes a cutting sound.

Phenomenon	Remedy

■ RHYTHM

The rhythm does not sound.	• The **BALANCE** volumes are set to 0. Press the **DRUMS** (+) button to adjust the volume. • The MIDI clock is set to the external clock. Set the MIDI clock to the internal clock.
The only rhythm produced is a hi-hat and bass drum sound.	• This is the rhythm sound produced when the **KEYBOARD PERCUSSION** button is on. When the **KEYBOARD PERCUSSION** button is turned off, the rhythm returns to normal.

■ AUTO PLAY CHORD

Some parts do not sound.	• Parts whose volumes are set to 0 with the **BALANCE** buttons or **SUB BALANCE/MIDI** button do not sound. Adjust the volume for each part with the respective **BALANCE** button or the **SUB BALANCE/MIDI** button. • When the **KEYBOARD PERCUSSION** is played on the keyboard, the **ACCOMP** and **BASS** patterns do not sound. Turn off the **KEYBOARD PERCUSSION** button.

■ SEQUENCER

An error "beep" sounds when you attempt to record in the **SEQUENCER**.	• The remaining storage capacity of the **SEQUENCER** memory is 0.
Multi-track recording does not work.	• The playback track has been selected but the **START/STOP** button has not been pressed. A flashing track indicator shows the track which is ready for recording, and a lit track indicator shows a track which is ready for playback. To record one track while listening to another (playback) track, press the **START/STOP** button to begin playback.

■ MEMO

MIDI IMPLEMENTATION CHART

Keyboard [SX-KN220/SX-KN440] **(Transmitted)**

Function		POLY (KN220)/ POLY 1 (KN440)	POLY 2 (KN440)	ACCOMP 1	ACCOMP 2	ACCOMP 3	BASS	DRUMS	CONTROL	Remarks
Basic Channel	Default	1~16	1~16	1~16	1~16	1~16	1~16	1~16	1~16	memorized
	Changed	1~16	1~16	1~16	1~16	1~16	1~16	1~16	1~16	
Mode	Default	3	3	3	3	3	3	3	3	OMNI OFF POLY MODE
	Messages	×	×	×	×	×	×	×	×	
	Altered	—	—	—	—	—	—	—	—	
Note Number		31~102	31~102	31~102	31~102	31~102	31~102	36~69**	—	Changes depending on the position of the transpose control.
	True voice	—	—	—	—	—	—	—	—	
Velocity	Note ON	× (KN220) ○ (KN440)	× (KN220) ○ (KN440)	× (KN220) ○ (KN440)	× (KN220) ○ (KN440)	× (KN220) ○ (KN440)	× (KN220) ○ (KN440)	× (KN220) ○ (KN440)	—	
	Note OFF	× (9nH:v=0)	× (9nH:v=0)	× (9nH:v=0)	× (9nH:v=0)	× (9nH:v=0)	× (9nH:v=0)	× (9nH:v=0)	—	
After Touch	Key's	×	×	×	×	×	×	×	×	
	Ch's	×	×	×	×	×	×	×	×	
Pitch Bender		× (KN220) ○ (KN440)	× (KN220) ○ (KN440)	× (KN220) ○ (KN440)	× (KN220) ○ (KN440)	× (KN220) ○ (KN440)	× (KN220) ○ (KN440)	×	×	
Control Change	1	× (KN220) ○ (KN440)	× (KN220) ○ (KN440)	× (KN220) ○ (KN440)	× (KN220) ○ (KN440)	× (KN220) ○ (KN440)	× (KN220) ○ (KN440)	×	×	modulation
	7	○	○	○	○	○	○	○	×	volume
	64	○	○	○	×	×	○	×	×	sustain
	80	×	×	○	×	×	×	×	×	auto play chord
	82	×	×	×	×	×	×	○	×	intro & ending, fill in
	93	○	○	×	×	×	×	×	×	chorus
Prog Change		○	○	○	× (KN220) ○ (KN440)	× (KN220) ○ (KN440)	○	○	×	
	True #	—	—	—	—	—	—	—	—	
System exclusive		×								
System common	Song Pos	×								
	Song Sel	×								
	Tune	×								
System Real Time	Clock	○								
	Commands	* ○ ×								start/stop, continue
Aux Messages	Local ON/OFF	×	×	×	×	×	×	×	—	
	All notes OFF	○	○	○	○	○	○	○	—	
	Active Sense	○								
	Reset	×								
Notes		* ○ × .....Whether or not the data for each of these items is transmitted can be set. **When the program change mode is set to Technics (on), note numbers for **DRUMS** differ.								

Mode 1: OMNI ON, POLY **Mode 2:** OMNI ON, MONO ○: Yes

Mode 3: OMNI OFF, POLY **Mode 4:** OMNI OFF, MONO ×: No

Keyboard [SX-KN220/SX-KN440] **(Recognized)**

Function		POLY (KN220)/ POLY 1 (KN440)	ACCOMP 1	ACCOMP 2	ACCOMP 3	BASS	DRUMS	CONTROL	Remarks
Basic Channel	Default	1~16	1~16	1~16	1~16	1~16	1~16	1~16	memorized (KN440)
	Changed	1~16	1~16	1~16	1~16	1~16	1~16	1~16	
Mode	Default	3	3	3	3	3	3	3	OMNI OFF POLY MODE
	Messages	×	×	×	×	×	×	×	
	Altered	—	—	—	—	—	—	—	
Note Number		0~127	0~127	0~127	0~127	0~127	36~69***	—	Changes depending on the sound.
	True voice	36~119	36~119	36~119	36~119	24~107	36~69	—	
Velocity	Note ON	○	○	○	○	○	○	—	
	Note OFF	×	×	×	×	×	×	—	
After Touch	Key's	×	×	×	×	×	×	×	
	Ch's	×	×	×	×	×	×	×	
Pitch Bender		○	○	○	○	○	×	×	
Control Change	1	○	○	○	○	○	×	×	modulation
	7	○	○	○	○	○	○	×	volume
	64	○	○	○	○	○	×	×	sustain
	80	×	○	×	×	×	×	×	auto play chord
	82	×	×	×	×	×	○	×	intro & ending, fill in
	93	○	×	×	×	×	×	×	chorus
Prog Change	True #	0~47 0~3** (KN440)	0~47	0~47	0~47	0~15	0~23 (KN220) 0~31 (KN440)		
System exclusive		×							
System common	Song Pos	×							
	Song Sel	×							
	Tune	×							
System Real Time	Clock	○							
	Commands	* ○ ×							start/stop, continue
Aux Messages	Local ON/OFF	×	×	×	×	×	×	—	
	All notes OFF	○	○	○	○	○	○	—	
	Active Sense	○							
	Reset	×							
Notes		* ○ × .....Whether or not the data for each of these items is transmitted can be set. **P. MEMO/P. CG ***When the program change mode is set to Technics (on), note numbers for **DRUMS** differ.							

Mode 1: OMNI ON, POLY **Mode 2:** OMNI ON, MONO ○: Yes
Mode 3: OMNI OFF, POLY **Mode 4:** OMNI OFF, MONO ×: No

PRECAUTIONS BEFORE SERVICING

■ Precautions for measuring of the output waveforms.

1. Please set the measurement conditions as each check points.
2. The waveform was measured by "National Digital Storage Oscilloscope VP-5730A". Therefore the waveforms of musical tone signals shown may somewhat change due to variation of timing of triggering.
3. Since the 1/10 of the test probe is used, the indicated voltage value on bottom part of the each waveform photo is 1/10 of the actual value. (e.g. 0.2V/cm should be 2.0V/cm)

■ Important safety notice:

Components identified by ⚠ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

■ Symbolic Marks

The symbolic marks for resistors and capacitors which used in this circuits are classified as following TABLE-1 and TABLE-2.

1. RESISTORS
   - Resistors without symbolic mark are FIXED CARBON FILM RESISTORS (ERD-type).
   - All resistors are 1/4WATT, ±5% TOLERANCE unless otherwise designated in the schematic diagrams.

(TABLE-1)

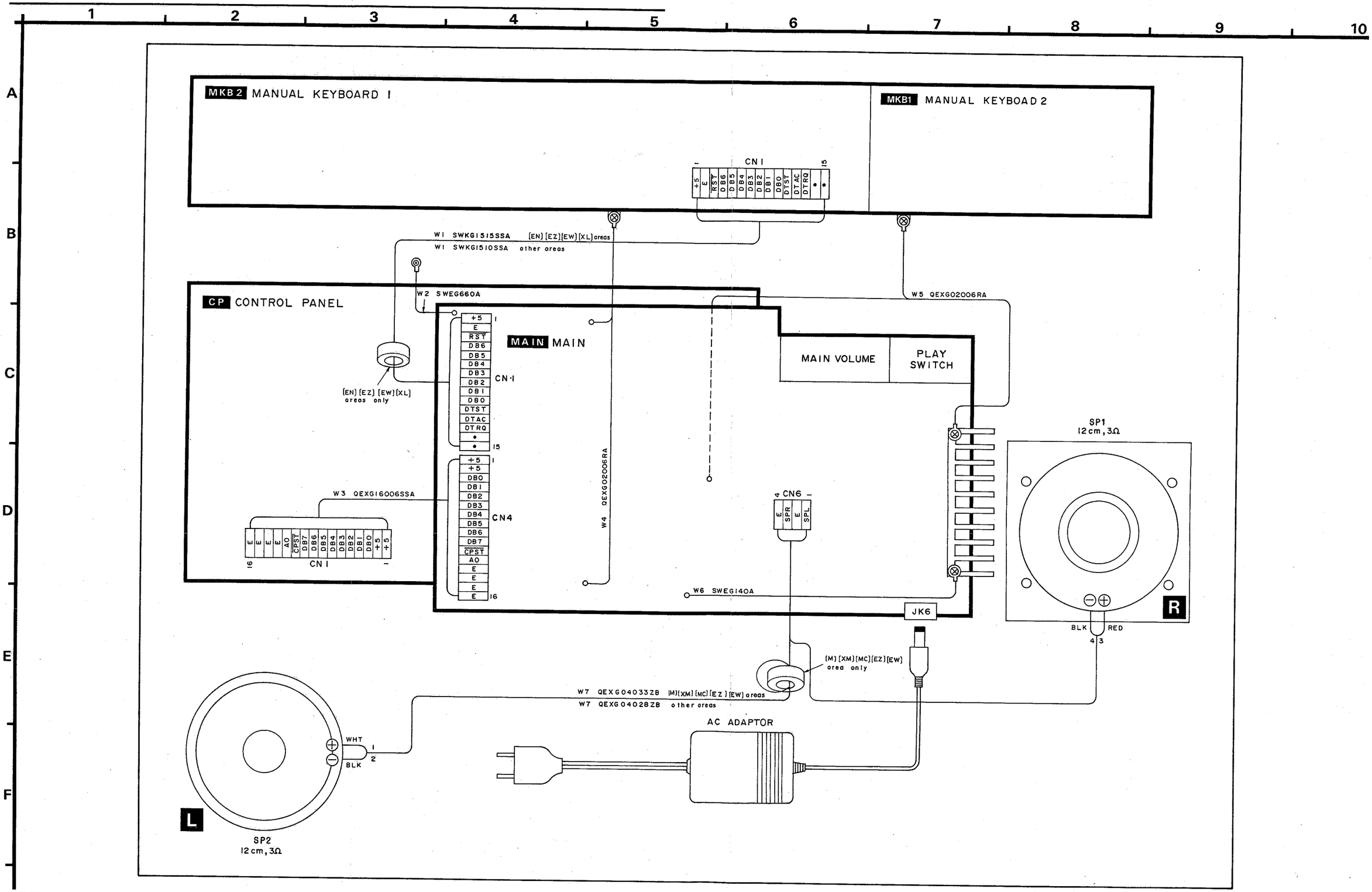
SYMBOL	SPECIFICATION	SYMBOL	SPECIFICATION
Ⓕ	Fixed Carbon Film Resistors "FLAME-PROOF" (ERD—F—type)	Ⓕ	Fixed Metal Film Resistors "FLAME-PROOF" (ERX—type)
Ⓕ	Fixed Wire Wound Resistors "FLAME-PROOF" (ERF—type)	[F]	Fuse Type Fixed Metal Oxide Film Resistors "FLAME-PROOF" (ERQ—type)
Ⓕ	Fixed Metal Oxide Film Resistors "FLAME-PROOF" (ERG—type)	[F]	Fuse Type Fixed Carbon Film Resistors "FLAME-PROOF" (ERD2FC—type)
Ⓖ	Fixed Metal Film Resistors (Precision and High Stability) (ERO—type)		

2. CAPACITORS
   - Capacitors without symbolic mark are POLYESTER CAPACITORS. (ECQM-type, ECQG-type, ±10% Tolerance)
   - Polarized capacitors without symbolic mark are Aluminum Electrolytic Capacitors. (ECEA—type, ±20% Tolernace)

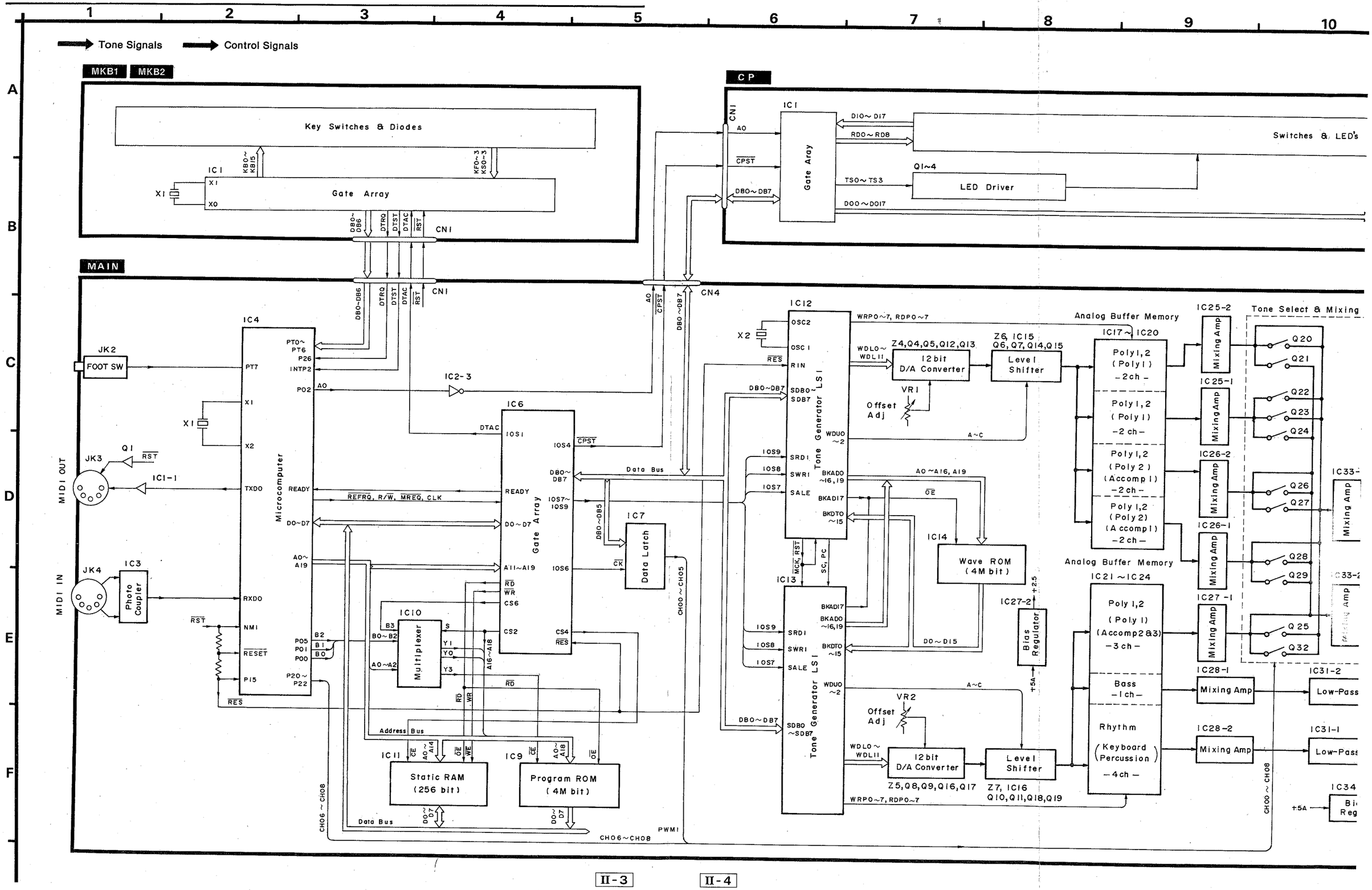
(TABLE-2)

SYMBOL	SPECIFICATION	TYPE
Ⓝ	Non-Polarised Electrolytic Capacitors	ECEA—KN—type
Ⓨ	Non-Polarised Electrolytic (for Network System)	ECEA—Y—type
Ⓜ	Aluminum Electrolytic Capacitors (Low leakage current type)	ECEA—M—type
Ⓩ	Aluminum Electrolytic Capacitors (Low impeadance type)	ECEA—Z—type
Ⓣ	Tantalum Solid Electrolytic Capacitors	ECS—type
Ⓣ	Metalized Plastic Film Capacitors (TF Series)	ECQV—type
Ⓣ	Polyester Film Capacitors	ECQB—type
○	Temperature Compensating Ceramic Capacitors	ECC—type
○	High-Dielectric Constant Ceramic Capacitors	ECK—type ECR—type
○	Ceramic Capacitors (Cylinder type)	ECBA—type
	Metalized Polyester Film Capacitors for Across the Line	ECQ—EW—type
	Aluminum Electrolytic Capacitors for smooting Circuit	ECES—type

WIRING CONNECTION DIAGRAM



BLOCK DIAGRAM



5 6 7 8 9 10 11 12 13 14

CP

CN1

IC1

AO

$\overline{CPST}$

DB0~DB7

Gate Array

D10~D17

RD0~RD8

Switches & LED's

Q1~4

TS0~TS3

LED Driver

D00~D017

IC2~4

Buffer

CN4

AO

$\overline{CPST}$

DB0~DB7

IC12

X2

OSC2

OSC1

$\overline{RES}$

RIN

DB0~DB7

SDB0~SDB7

IOS9

IOS8

IOS7

SRDI

SWRI

SALE

Tone Generator LSI

WDUO ~2

BKADO ~16,19

BKADI7

BKDTO ~15

WRP0~7, RDP0~7

WDL0~ WDL11

Z4,Q4,Q5,Q12,Q13

12bit D/A Converter

Z6, IC15 Q6,Q7,Q14,Q15

Level Shifter

VR1

Offset Adj

A~C

Analog Buffer Memory

IC17~IC20

Poly1,2 (Poly1) -2ch-

Poly1,2 (Poly2) (Accomp1) -2ch-

Poly1,2 (Poly2) (Accomp1) -2ch-

IC25-2

IC25-1

IC26-2

IC26-1

Mixing Amp

Tone Select & Mixing

Q20

Q21

Q22

Q23

Q24

Q26

Q27

Q28

Q29

Q25

Q32

IC33-1

IC33-2

IC30-1

IC30-2

Low-Pass Filter

IC32-1

IC32-2

L ch Mixing Amp

R ch Mixing Amp

IC35

Dynamic Noise Reduction

VR4

MAIN VOLUME

IC37

Power Amplifier (L ch)

Power Amplifier (R ch)

SPL

SPR

E

CN6

SP2 12cm,3Ω

SP1 12cm,3Ω

Play SW S1

JK6

DC IN

Mute

Q31,D16,IC38-1

+5

+5A

+5V Regulator

IC38-2

$\overline{RST}$

Reset Circuit

Q30,D14

Muting Control

+5V Regulator

STB

+9

+9V Regulator

JK8

Headphones

JK9

L

JK10

R

Line Out

IC7

Data Latch

XI

CH00~CH05

Data Bus

IC14

Wave ROM (4Mbit)

MCK, RST

SC, PC

IC13

DO~D15

IC27-2

Bias Regulator

+2.5

+5A

Analog Buffer Memory

IC21~IC24

Poly1,2 (Poly1) (Accomp2&3) -3ch-

Bass -1ch-

Rhythm (Keyboard Percussion) -4ch-

IC27-1

IC28-1

IC28-2

IC31-2

IC31-1

IC34-2

+5AA

CH00~CH08

VR2

Offset Adj

WDL0~ WDL11

12bit D/A Converter

Z5,Q8,Q9,Q16,Q17

Level Shifter

Z7, IC16 Q10,Q11,Q18,Q19

WRP0~7, RDP0~7

PWM1

6~CH08

II-3

II-4

II-5

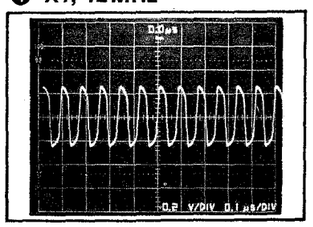
1 2 3 4 5 6 7 8 9 10

A B C D E F

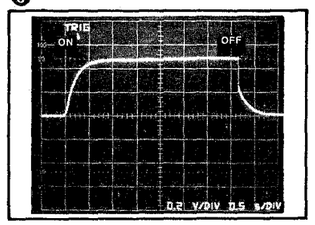
■ Measuring Conditions

The tone signal output varies with the level of key pressing force.
In this measurement, the waveform obtained with maximum key pressing force is shown.

❹ X1, 12MHz

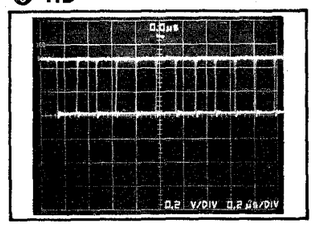


❺

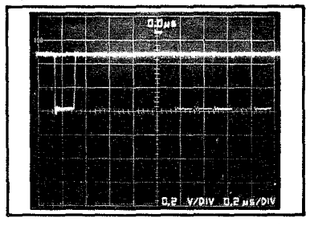


• POWER SW.....ON→OFF

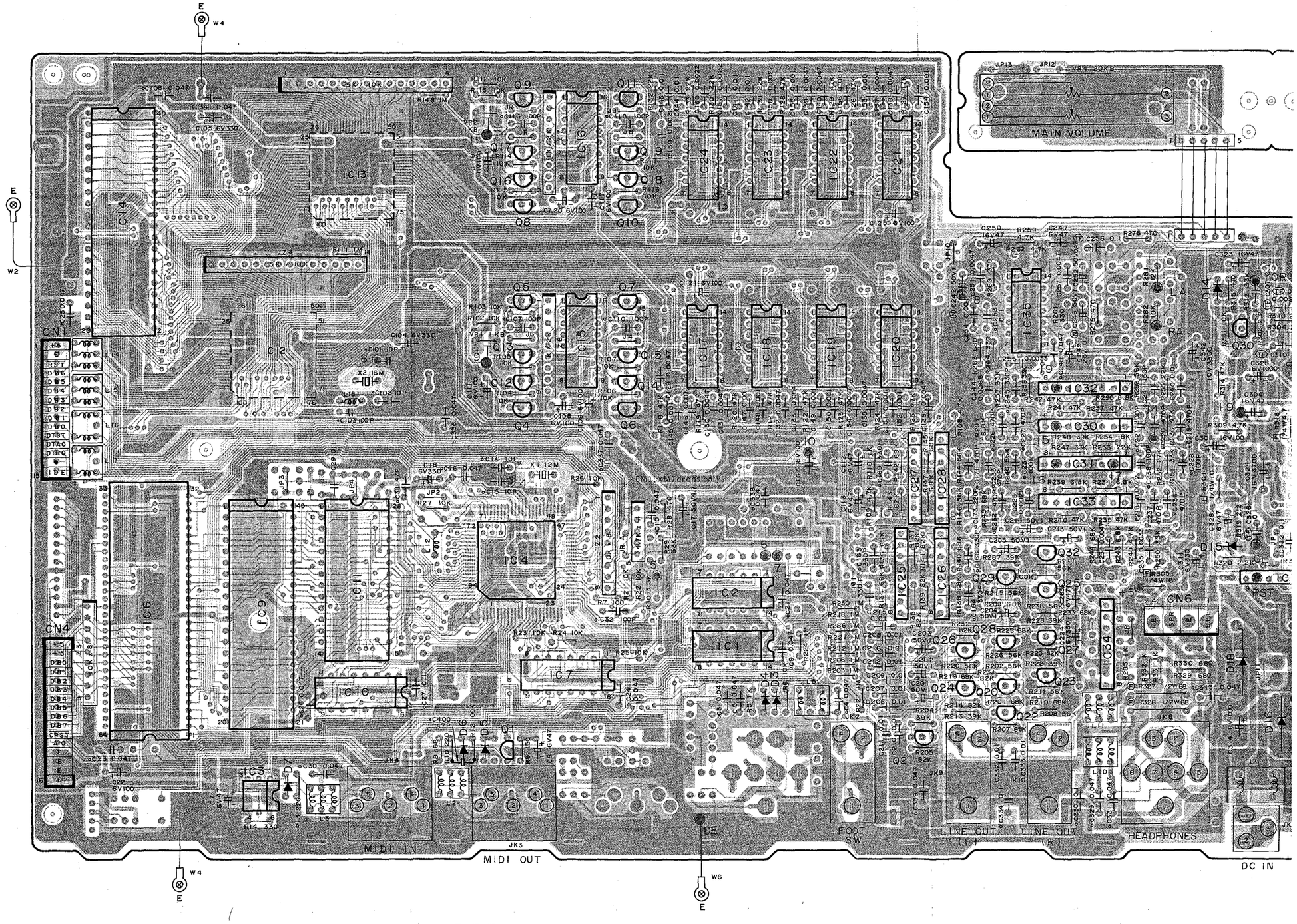
❻ $\overline{RD}$



❼ $\overline{WR}$



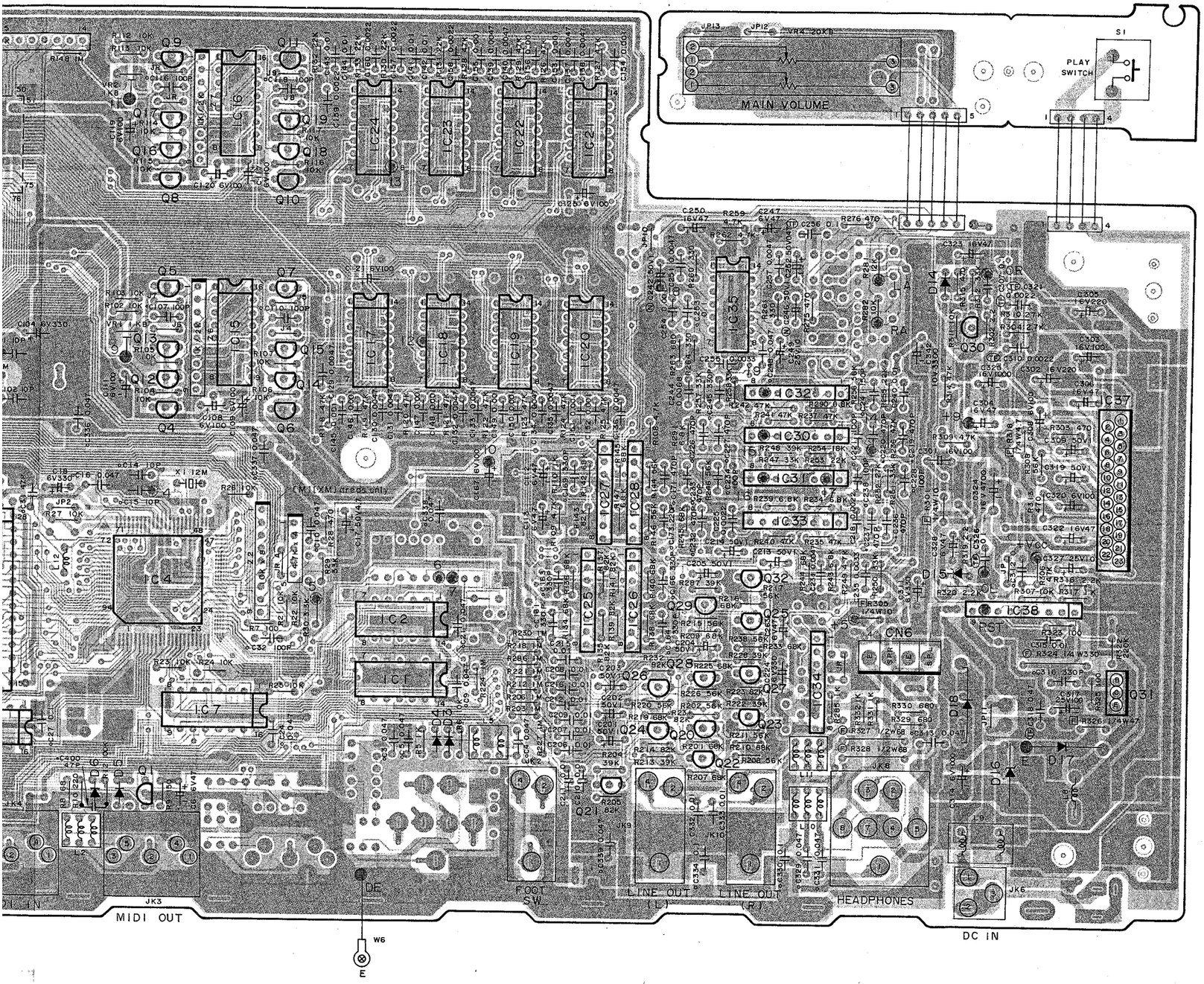
MAIN MAIN CIRCUIT BOARD — Circuit view on top of P.C.B. — [M] [XM] areas — SXPG204091 — Other area



5 6 7 8 9 10 11 12 13 14

Circuit view on top of P.C.B.

[M] [XM] areas **SXPG204091** Other areas **SXPG204071**



- The Main Volume P.C.B. and the Play Switch P.C.B. are part of Main P.C.B. assembly.
  It will not be supplied as separated part (as P.C.B.)

MAIN

NOTES:

- IC'S

IC1:	SVIGM74LS07
IC2:	SVIGTC40H004
IC3:	SVIGTLP513
IC4:	SVIGD70320GJ
IC6:	SVIGMB621407
IC7:	SVIGTC40H174
IC9:	QSIGH3C04C67
IC10:	SVIGTC40H157
IC11:	SVIGHM65256
IC12, 13:	MN6635
IC14:	QSIGU3C04136
IC15, 16:	SVIGT74H4051
IC17~24:	SVIGM74H4066
IC25~28, 30~34:	SVIGM5218L
IC35:	SVIGLM1894N
IC36:	SVIGM5241L
IC37:	AN7134N-R
IC38:	AN6913

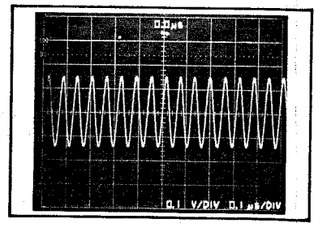
- TRANSISTORS

Q1, 2, 4~11:	2SA1015-GR
Q12~19, 30:	2SC2320LFG
Q20~29, 32:	2SJ105GR
Q31:	2SB953AQP

- DIODES

D3~7, 14:	MA165TA5
D15:	MA4051MTA
D16:	MA2062LF
D17, 18:	SVDGRK14S

8 X2, 16MHz



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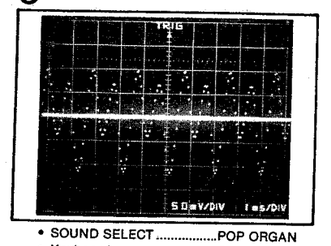
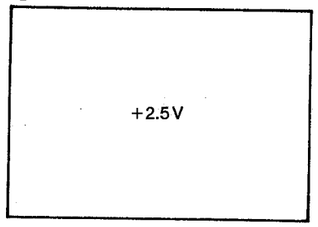


- SOUND SELECT .....POP ORGAN
- Keyboard .....C4 Key

10



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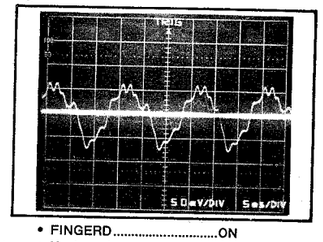
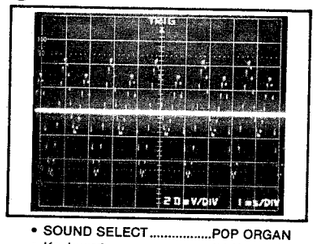


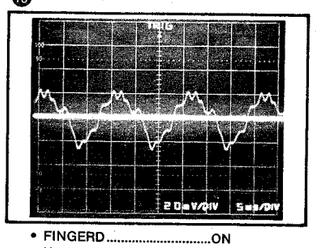
- FINGERD .....ON
- Keyboard .....C1 Key

12



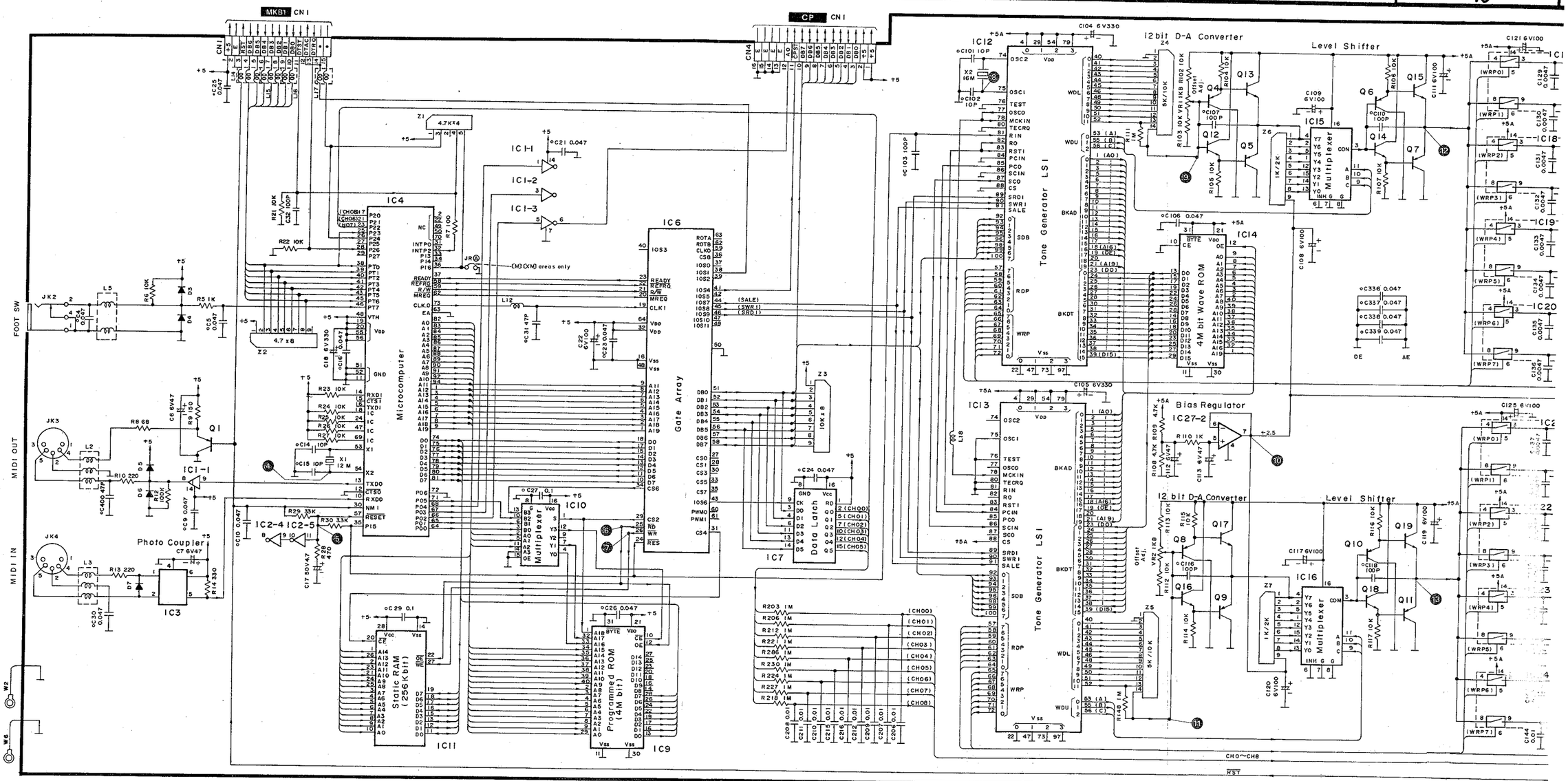
- SOUND SELECT .....POP ORGAN
- Keyboard .....C4 Key

13

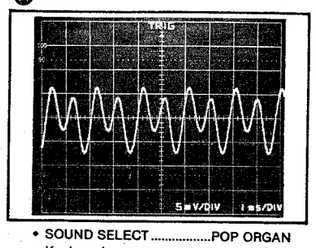


- FINGERD .....ON
- Keyboard .....C1 Key

MAIN CIRCUIT DIAGRAM

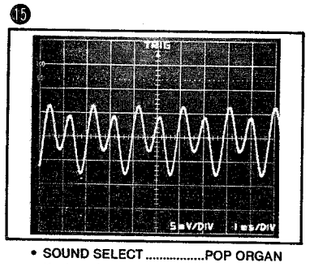


14



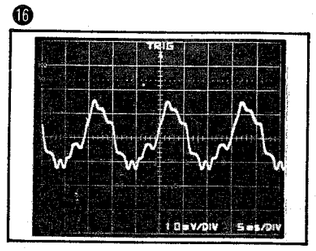
- SOUND SELECT .....POP ORGAN
- Keyboard .....C4 Key

15



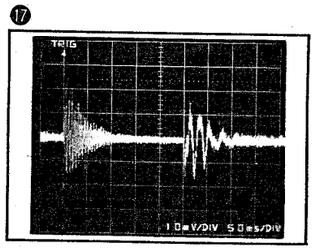
- SOUND SELECT .....POP ORGAN
- Keyboard .....C4 Key

16



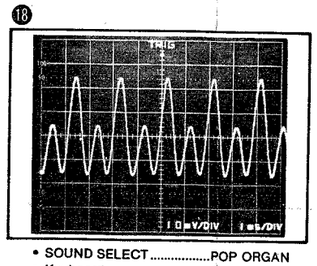
- FINGERD .....ON
- Keyboard .....C1 Key

17



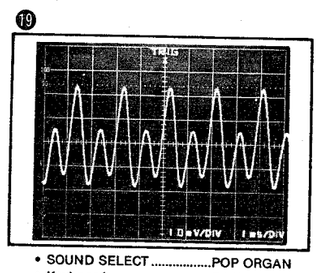
- RHYTHM SELECT .....MARCH 1
- START STOP.....START

18

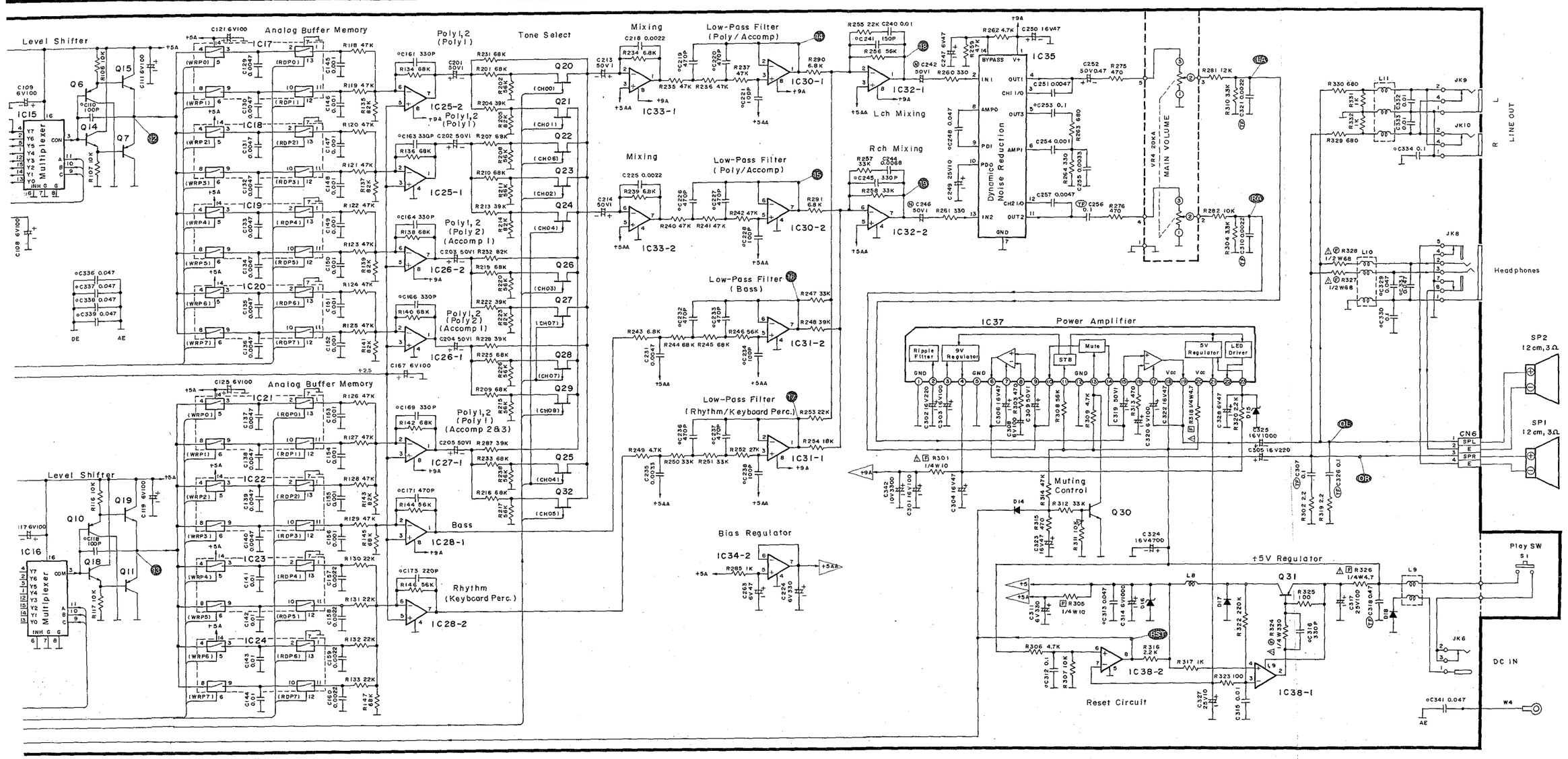


- SOUND SELECT .....POP ORGAN
- Keyboard .....C4 Key

19



- SOUND SELECT .....POP ORGAN
- Keyboard .....C4 Key



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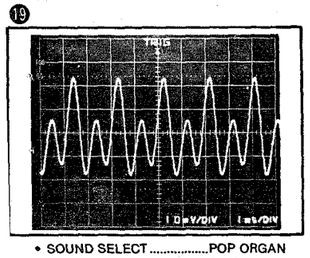
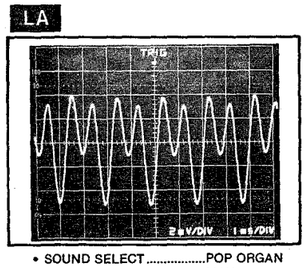


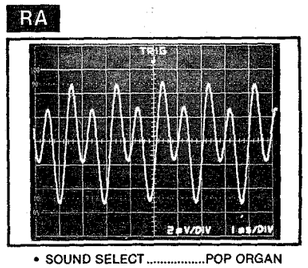
- SOUND SELECT .....POP ORGAN
- Keyboard .....C4 Key

LA



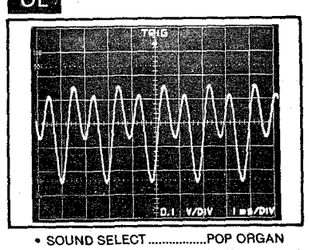
- SOUND SELECT .....POP ORGAN
- MAIN VOLUME .....MAX
- Keyboard .....C4 Key

RA



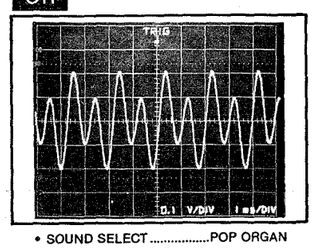
- SOUND SELECT .....POP ORGAN
- MAIN VOLUME .....MAX
- Keyboard .....C4 Key

OL



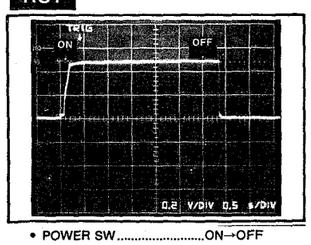
- SOUND SELECT .....POP ORGAN
- MAIN VOLUME .....MAX
- Keyboard .....C4 Key

OR



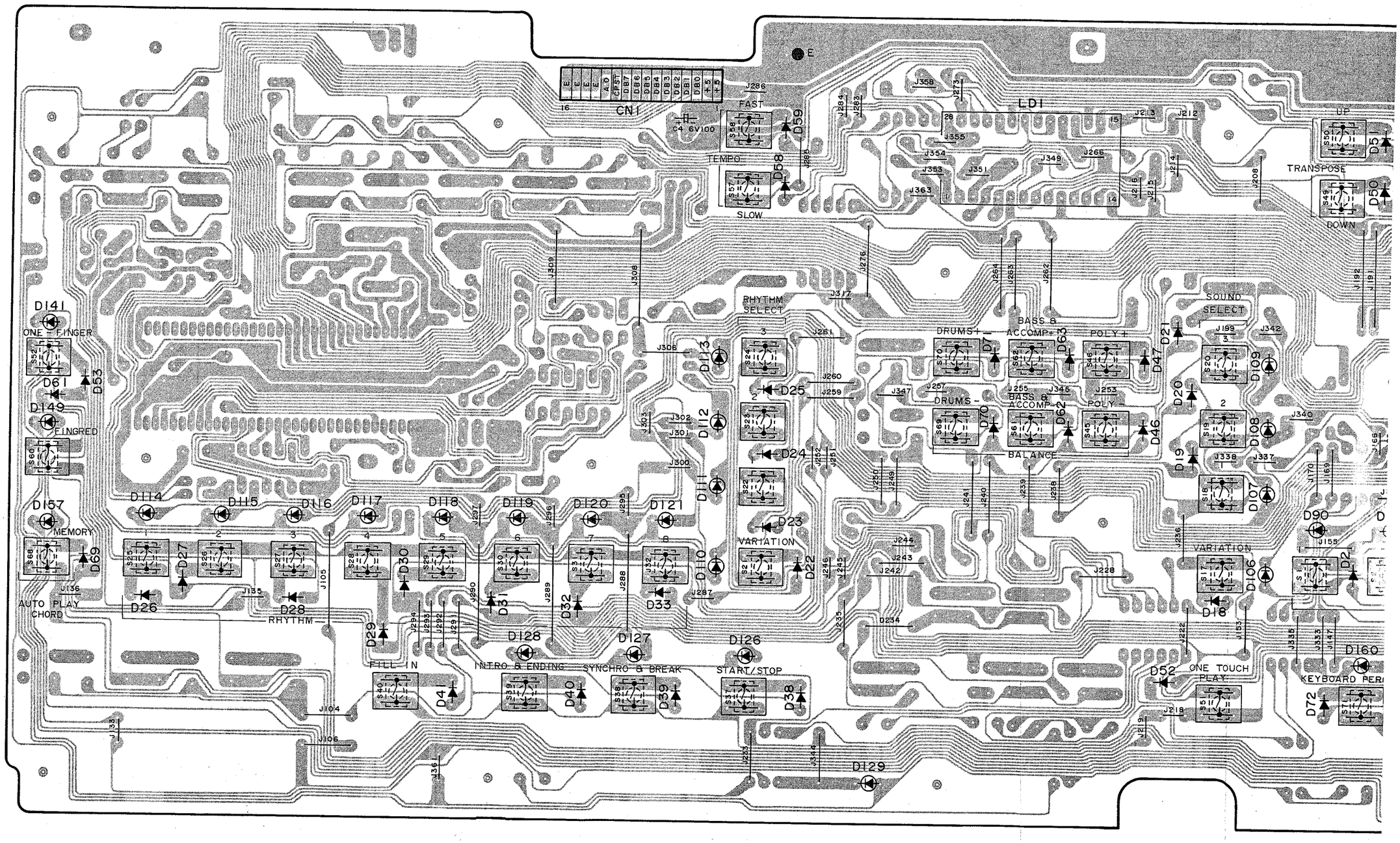
- SOUND SELECT .....POP ORGAN
- MAIN VOLUME .....MAX
- Keyboard .....C4 Key

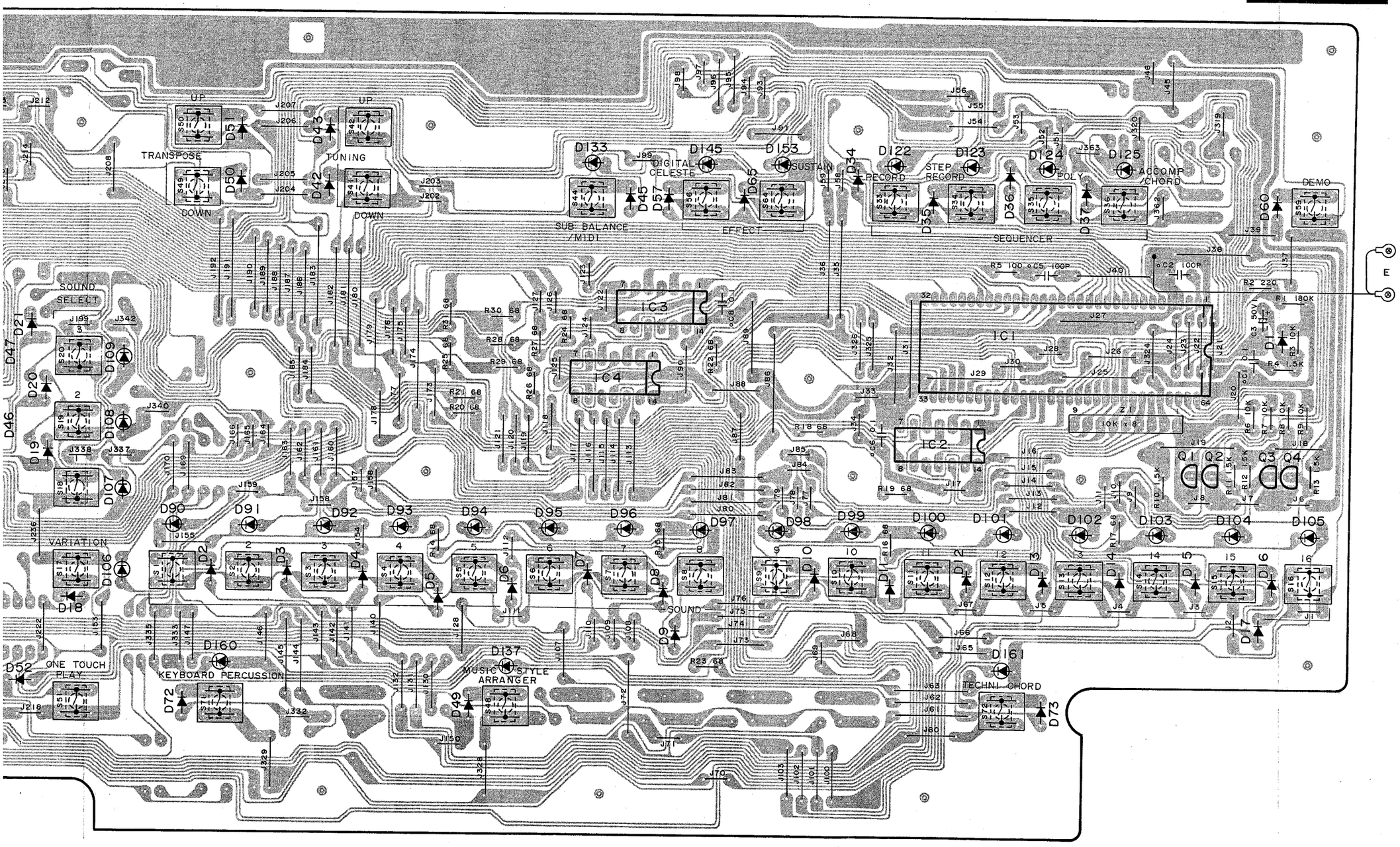
RST



- POWER SW .....ON→OFF

CP CONTROL PANEL CIRCUIT BOARD

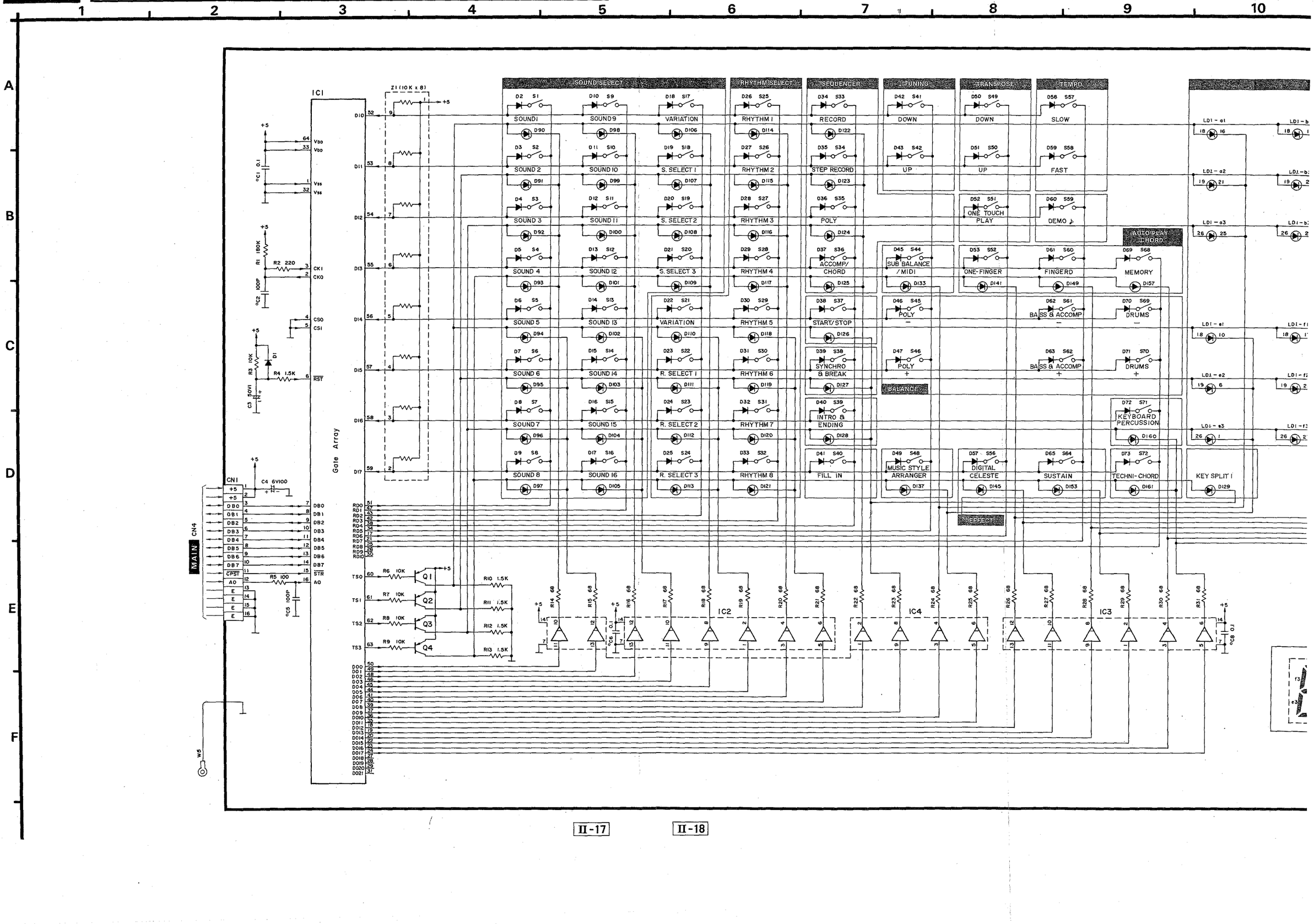


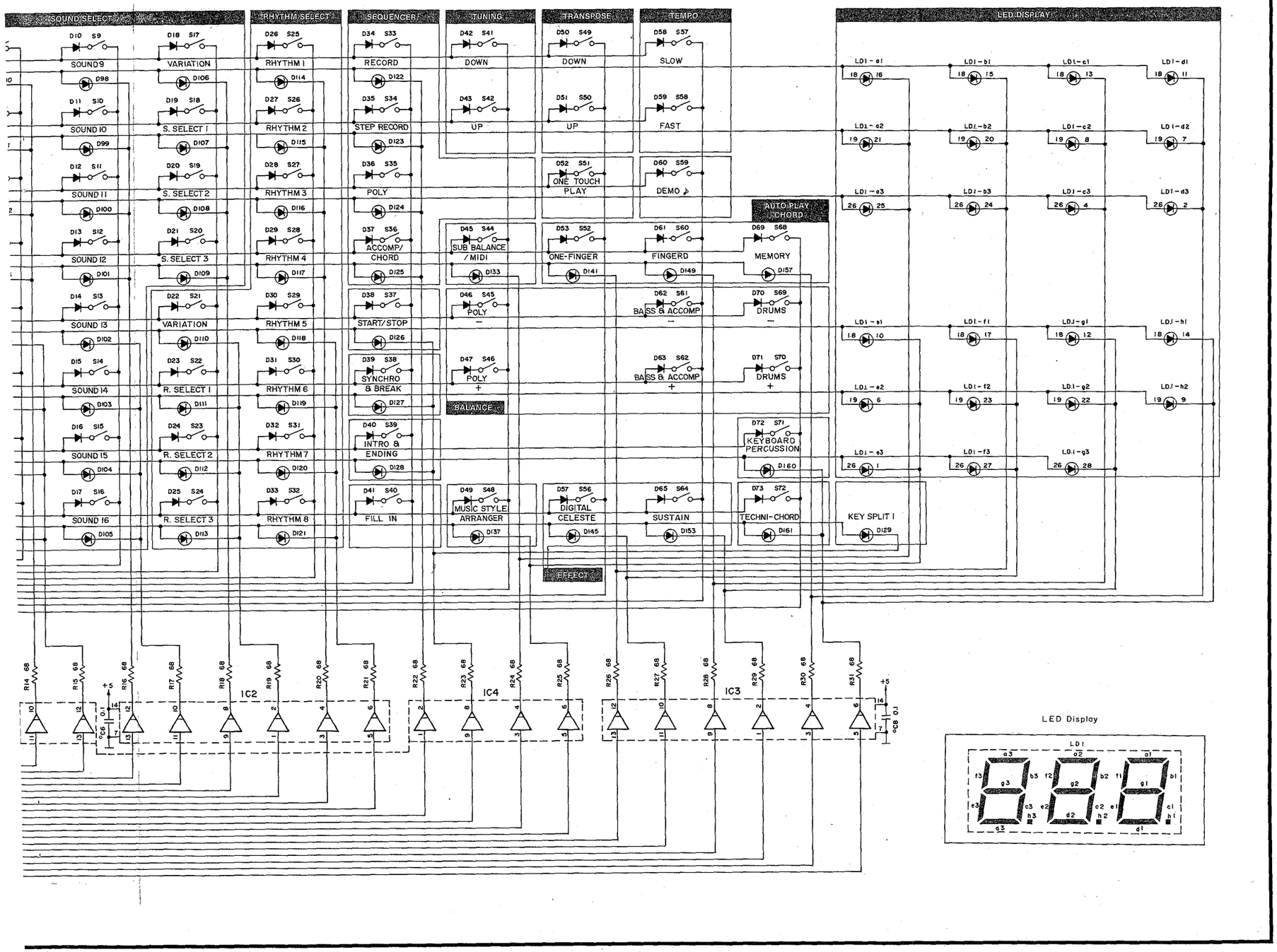


NOTES:

- IC'S
  - IC1: SVIGM603A121
  - IC2~4: SVIGM74LS07
- TRANSISTORS
  - Q1~4: 2SA830SB
- DIODES
  - D1~43, 45~47, 49~53, 57~63, 65, 69~73: MA165TA5
  - D90~121, 126~129, 137, 141, 145, 149, 153, 157, 160, 161: SEL4117RM
  - D122~125, 133: SEL4417GM

CONTROL PANEL CIRCUIT DIAGRAM

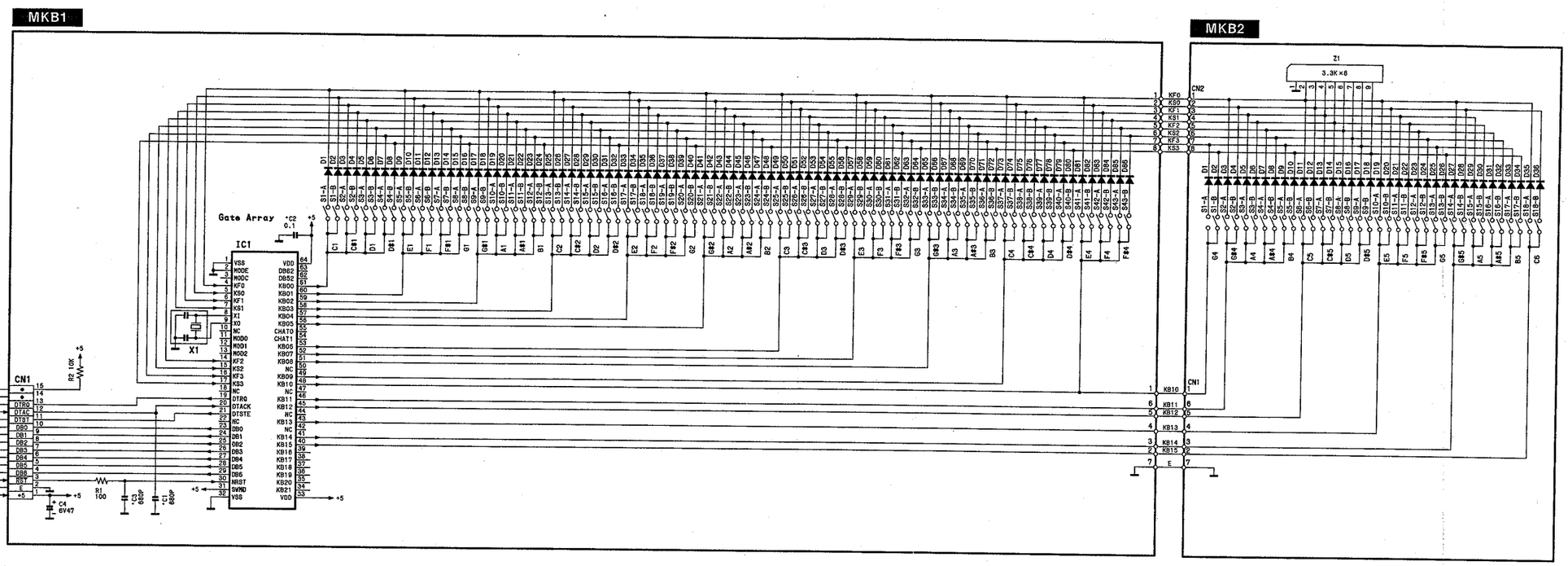


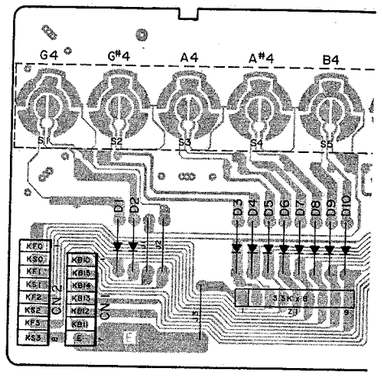


NOTES:

- IC'S
  - IC1: SVIGM603A121
  - IC2~4: SVIGM74LS07
- TRANSISTORS
  - Q1~4: 2SA830SB
- DIODES
  - D1~43, 45~47, 49~53, 57~63, 65, 69~73: MA165TA5
  - D90~121, 126~129, 137, 141, 145, 149, 153, 157, 160, 161: SEL4117RM
  - D122~125, 133: SEL4117GM

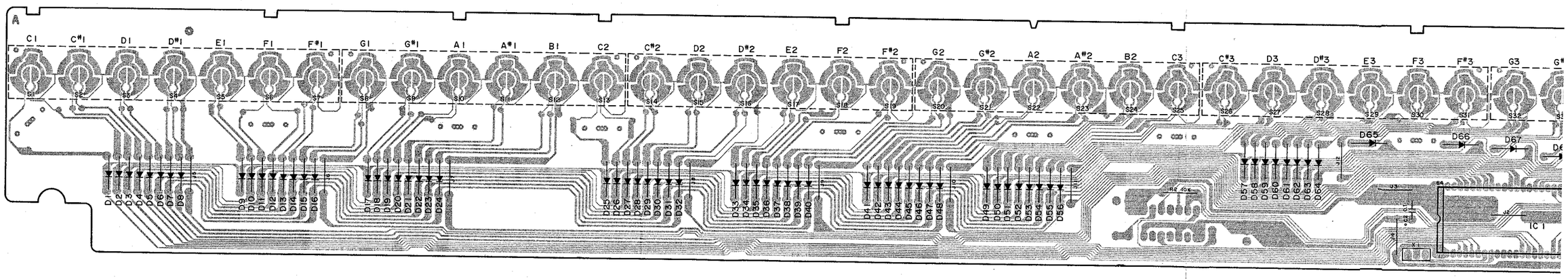
MKB1 MKB2 MANUAL KEYBOARD 1, 2 CIRCUIT DIAGRAM AND CIRCUIT BOARD

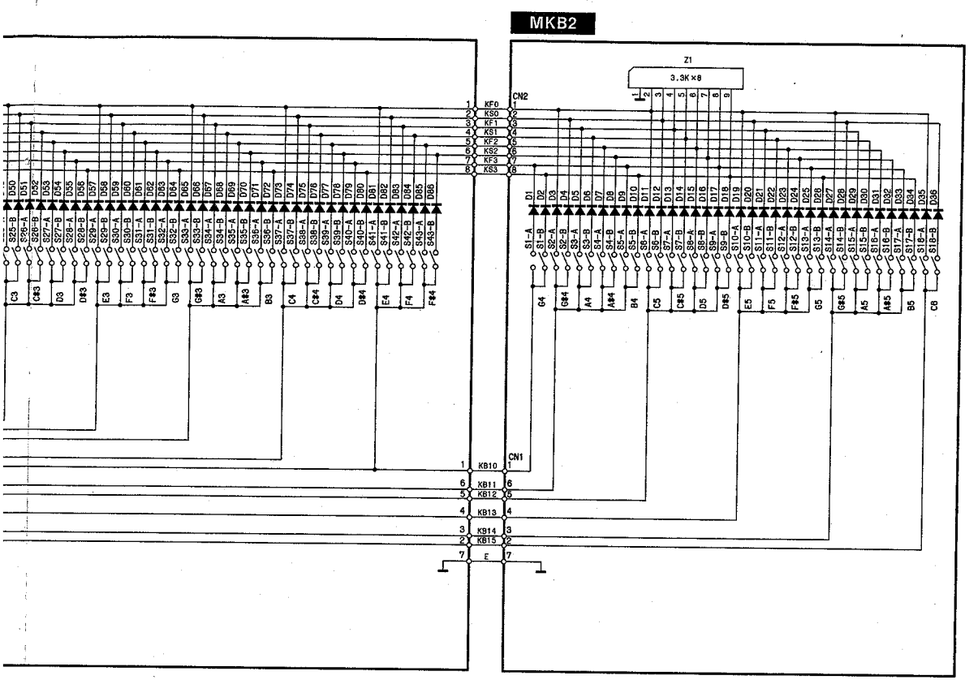




MKB1
NOTES:
- IC'S
  IC1:
- DIODES
  D1~87:

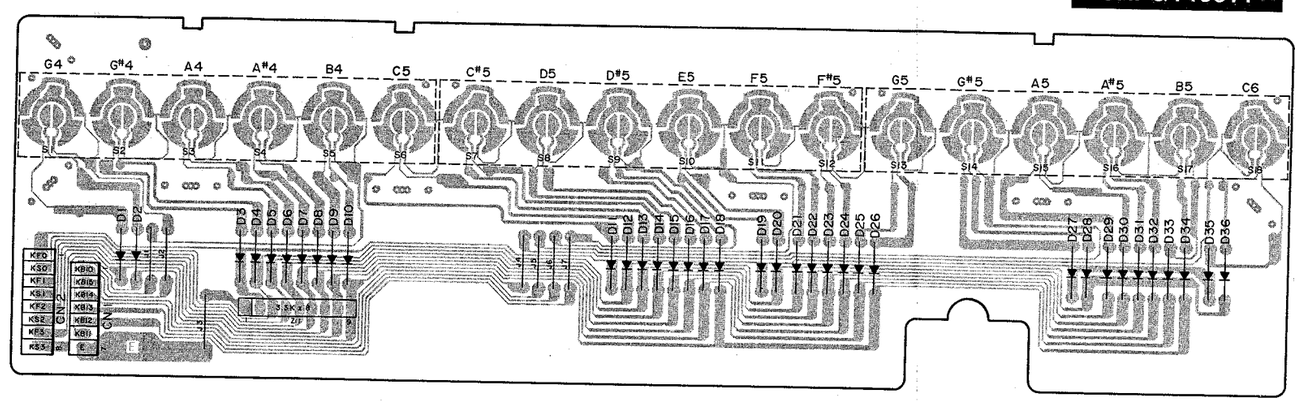
MKB1





MKB2

SXPG143611



MKB1

NOTES:

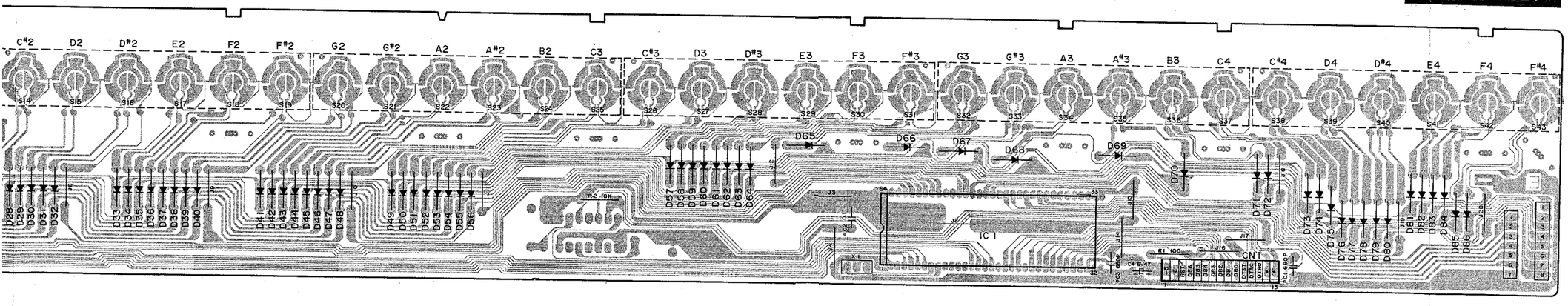
- IC'S
  IC1: MN50020PGV
- DIODES
  D1~87: MA162A

MKB2

NOTES:

- DIODES
  D1~36: MA162A

SXPG143521



REPLACEMENT PARTS LIST.....P.C.B. and Wiring Parts

Notes:

1. Printed circuit board assembly with mark (NLA) is no longer available after production discontinuation of the complete set.
2. Important safety notice
   Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
3. The "S" mark is service standard parts and may differ from production parts.
4. ○ mark are new parts.
5. For part No. with area mark, check the area when placing an order.

■ PRINTED CIRCUIT BOARD

	NLA	Area	Part No.	Description	Per/Set
○	NLA	M XM	SXPG204091	MAIN	1
○	NLA	Others	SXPG204071	MAIN	1
	NLA		SXPG204141	CP	1
	NLA		SXPG143521	MKB1	1
	NLA		SXPG143611	MKB2	1

MAIN MAIN CIRCUIT

	Ref. No.	Part No.	Description	Per/Set
		INTEGRATED CIRCUITS		
	IC1	SVIGM74LS07	Hex Buffers (O.C.)	1
	IC2	SVIGTC40H004	Hex Inverters	1
	IC3	SVIGTLP513	Photo Coupler	1
	IC4	SVIGD70320GJ	16 bit Microcomputer	1
	IC6	SVIGMB621407	Gate Array	1
	IC7	SVIGTC40H174	Hex D-type Flip-Flops	1
○	IC9	QSIGH3C04C67	4M bit Programmed Mask RAM	1
	IC10	SVIGTC40H157	Data Selector	1
	IC11	SVIGHM65256	256K bit Pseudo Static RAM	1
	IC12, 13	MN6635	Tone Generator LSI	2
	IC14	QSIGU3C04136	4M bit Wave ROM	1
S	IC15, 16	SVIGT74H4051	8-channel Multiplexer	2
	IC17~24	SVIGM74H4066	Quad Bilateral Switches	8
	IC25~28, 30~34	SVIGM5218L	Operational Amplifier	9
	IC35	SVIGLM1894N	Dynamic Noise Reduction	1
	IC37	AN7134NR	Power Amplifier	1
	IC38	AN6913	Comparator	1
		TRANSISTORS		
S	Q1, 4~11	2SA1015-GR	2SA933STRS (SUB. Part)	9
S	Q12~19, 30	2SC2320LFG	2SC1310FG (SUB. Part)	9
	Q20~29, 32	2SJ105GR	FET	11
	Q31	2SB953AQP		1
		DIODES		
	D3~7, 14	MA165TA5		6
	D15	MA4051MTA	Zener, 5.1V	1
	D16	MA2062LF	Zener, 6.2V	1
	D17, 18	SVDGRK14S	Diode	2
		OSCILLATORS		
	X1	QSXG1A1200A	12MHz, Quartz Oscillator	1
	X2	QSXG1A1600A	16MHz, Quartz Oscillator	1

	Ref. No.	Part No.	Description	Per/Set
		COMPONENT COMBINATIONS		
S	Z1	EXBPI4472JM	4.7KΩ×4	1
S	Z2, 3	EXBPI8103JM	10KΩ×8	2
S	Z4, 5	EXBLD12502GC	5K/10K, Ladder Network	2
S	Z6, 7	EXAMR14A1002	1KΩ/2KΩ, Ladder Network	2
		COILS		
	L2, 3, 10, 11, 14, 15	QLQGT3T150SA	Coil	6
	L5, 16, 17	QLQGT2T150SA	Coil	3
	L8	SLCGR8121D	Coil	1
	L9	QLQGT2T200SA	Coil	1
	L12, 18	QLQGT1B600MA	Coil	2
		JACKS		
	JK2, 9, 10	SJJG400A	FOOT SW, LINE OUT	3
	JK3, 4	SJSG1370A	MIDI OUT, IN	2
	JK6	SJJG440A	DC INPUT JACK	1
	JK8	SJJG100A	HEADPHONES	1
		SWITCH		
	S1	QSPG1004AA	Play Switch	1
		SEMI-FIXED RESISTORS		
	VR1, 2	EVND8AA03B13	1KΩ B, Offset Adj.	2
		VARIABLE RESISTOR		
	VR4	QRVG30P01A24	20KΩ A, Main Volume	1
		WIRING PARTS		
	W2	SWEG660A	Wire	1
	W4	QEXG02006RA	Wire	1
	W6	SWEG140A	Wire	1
		RESISTORS		
	R5	ERDS2TJ102	1KΩ	1
	R6	ERDS2TJ103	10KΩ	1
	R7	ERDS2TJ101	100Ω	1
	R8	ERDS2TJ680	68Ω	1
	R9	ERDS2TJ151	150Ω	1
	R10	ERDS2TJ221	220Ω	1
	R12	ERDS2TJ104	100KΩ	1
	R13	ERDS2TJ221	220Ω	1
	R14	ERDS2TJ331	330Ω	1
	R21~27	ERDS2TJ103	10KΩ	7
	R28	ERDS2TJ471	470Ω	1
	R29	ERDS2TJ333	33KΩ	1

Ref. No.	Part No.	Description	Per/Set
R30	ERDS2TJ332	3.3KΩ	1
R102~107	ERDS2TJ103	10KΩ	6
R108, 109	ERDS2TJ472	4.7KΩ	2
R110	ERDS2TJ102	1KΩ	1
R111	ERDS2TJ105	1MΩ	1
R112~117	ERDS2TJ103	10KΩ	6
R118~129	ERDS2TJ473	47KΩ	12
R130~133	ERDS2TJ223	22KΩ	4
R134	ERDS2TJ683	68KΩ	1
R135	ERDS2TJ823	82KΩ	1
R136	ERDS2TJ683	68KΩ	1
R137	ERDS2TJ823	82KΩ	1
R138	ERDS2TJ683	68KΩ	1
R139	ERDS2TJ823	82KΩ	1
R140	ERDS2TJ683	68KΩ	1
R141	ERDS2TJ823	82KΩ	1
R142	ERDS2TJ683	68KΩ	1
R143	ERDS2TJ823	82KΩ	1
R144	ERDS2TJ563	56KΩ	1
R145	ERDS2TJ683	68KΩ	1
R146	ERDS2TJ563	56KΩ	1
R147	ERDS2TJ683	68KΩ	1
R148	ERDS2TJ105	1MΩ	1
R201	ERDS2TJ683	68KΩ	1
R202	ERDS2TJ563	56KΩ	1
R203	ERDS2TJ105	1MΩ	1
R204	ERDS2TJ393	39KΩ	1
R205	ERDS2TJ823	82KΩ	1
R206	ERDS2TJ105	1MΩ	1
R207	ERDS2TJ683	68KΩ	1
R208	ERDS2TJ563	56KΩ	1
R209, 210	ERDS2TJ683	68KΩ	2
R211	ERDS2TJ563	56KΩ	1
R212	ERDS2TJ105	1MΩ	1
R213	ERDS2TJ393	39KΩ	1
R214	ERDS2TJ823	82KΩ	1
R215	ERDS2TJ563	56KΩ	1
R216	ERDS2TJ683	68KΩ	1
R217	ERDS2TJ563	56KΩ	1
R218	ERDS2TJ105	1MΩ	1
R219	ERDS2TJ683	68KΩ	1
R220	ERDS2TJ563	56KΩ	1
R221	ERDS2TJ105	1MΩ	1
R222	ERDS2TJ393	39KΩ	1
R223	ERDS2TJ823	82KΩ	1
R224	ERDS2TJ105	1MΩ	1
R225	ERDS2TJ683	68KΩ	1
R226	ERDS2TJ563	56KΩ	1
R227	ERDS2TJ105	1MΩ	1
R228	ERDS2TJ393	39KΩ	1
R230	ERDS2TJ105	1MΩ	1
R231, 232	ERDS2TJ823	82KΩ	2
R233	ERDS2TJ683	68KΩ	1
R234	ERDS2TJ682	6.8KΩ	1
R235~237	ERDS2TJ473	47KΩ	3
R238	ERDS2TJ563	56KΩ	1
R239	ERDS2TJ682	6.8KΩ	1
R240~242	ERDS2TJ473	47KΩ	3
R243	ERDS2TJ682	6.8KΩ	1
R244, 245	ERDS2TJ683	68KΩ	2
R246	ERDS2TJ563	56KΩ	1
R247	ERDS2TJ333	33KΩ	1
R248	ERDS2TJ393	39KΩ	1
R249	ERDS2TJ472	4.7KΩ	1
R250, 251	ERDS2TJ333	33KΩ	2
R252	ERDS2TJ273	27KΩ	1
R253	ERDS2TJ223	22KΩ	1
R254	ERDS2TJ183	18KΩ	1
R255	ERDS2TJ223	22KΩ	1
R256	ERDS2TJ563	56KΩ	1
R257, 258	ERDS2TJ333	33KΩ	2
R259	ERDS2TJ472	4.7KΩ	1
R260, 261	ERDS2TJ331	330Ω	2
R262	ERDS2TJ472	4.7KΩ	1
R263	ERDS2TJ681	680Ω	1
R264	ERDS2TJ331	330Ω	1
R275, 276	ERDS2TJ471	470Ω	2
R281	ERDS2TJ123	12KΩ	1
R282	ERDS2TJ103	10KΩ	1
R285	ERDS2TJ102	1KΩ	1
R286	ERDS2TJ105	1MΩ	1
R287	ERDS2TJ393	39KΩ	1
R290, 291	ERDS2TJ682	6.8KΩ	2
⚠ R301	ERD2FCJ100	10Ω, 1/4W, Fuse Type	1
R302	ERDS2TJ2R2	2.2Ω	1
R303	ERDS2TJ471	470Ω	1
R304	ERDS2TJ332	3.3KΩ	1
⚠ R305	ERD2FCG100	10Ω, 1/4W, Fuse Type	1
R306	ERDS2TJ472	4.7KΩ	1
R307	ERDS2TJ103	10KΩ	1
R308	ERDS2TJ563	56KΩ	1
R309	ERDS2TJ472	4.7KΩ	1
R310	ERDS2TJ332	3.3KΩ	1
R311	ERDS2TJ103	10KΩ	1
R312	ERDS2TJ333	33KΩ	1
R313	ERDS2TJ471	470Ω	1
R314	ERDS2TJ473	47KΩ	1
R315	ERDS2TJ471	470Ω	1
R316	ERDS2TJ222	2.2KΩ	1
R317	ERDS2TJ102	1KΩ	1
⚠ R318	ERD2FCJ4R7	4.7Ω, 1/4W, Fuse Type	1
R319	ERDS2TJ2R2	2.2Ω	1
R320	ERDS2TJ222	2.2KΩ	1
R322	ERDS2TJ224	220KΩ	1
R323	ERDS2TJ101	100Ω	1
⚠ R324	ERD25FJ331	330Ω, 1/4W, Flame-Proof	1
R325	ERDS2TJ101	100Ω	1
R326	ERQ14AJ4R7	4.7Ω, 1/4W, Fuse Type	1
⚠ R327, 328	ERD50FJ680	68Ω, 1/2W, Flame-Proof	2
R329, 330	ERDS2TJ681	680Ω	2
R331, 332	ERDS2TJ102	1KΩ	2

CAPACITORS

C4, 5	ECKR1E473ZV	0.047μF	2
C6, 7	ECEA0JKA470	47μF, 6.3V	2
C9, 10	ECKR1E473ZV	0.047μF	2
C14, 15	ECCR1H100J	10pF	2
C16	ECKR1E473ZV	0.047μF	1
C17	ECEA1HKA4R7	4.7μF, 50V	1
C18	ECEA0JKA331	330μF, 6.3V	1
C21	ECKR1E427ZV	0.047μF	1
C22	ECEA0JKA101	100μF, 6.3V	1
C23~25	ECKR1E473ZV	0.047μF	3
C26	ECKR1E473ZV	0.047μF	1
C27	ECRR1H104ZF	0.1μF	1
C29	ECRR1H104ZF	0.1μF	1
C30	ECKR1E473ZV	0.047μF	1
C31	ECCR1H470J	47pF	1
C32	ECCR1H101J	100pF	1
C101, 102	ECCR1H100J	10pF	2
C103	ECCR1H101J	100pF	1
C104, 105	ECEA0JKA331	330μF, 6.3V	2
C106	ECKR1E473ZV	0.047μF	1
C107	ECCR1H101J	100pF	1
C108, 109	ECEA0JKA101	100μF, 6.3V	2

Ref. No.	Part No.	Description	Per/Set
C110	ECCR1H101J	100pF	1
C111	ECEA0JKA101	100μF, 6.3V	1
C112, 113	ECEA0JKA470	47μF, 6.3V	2
C116	ECCR1H101J	100pF	1
C117	ECEA0JKA101	100μF, 6.3V	1
C118	ECCR1H101J	100pF	1
C119~121	ECEA0JKA101	100μF, 6.3V	3
C125	ECEA0JKA101	100μF, 6.3V	1
C129~136	ECQG1H472KZ	0.0047μF	8
C137~140	ECQG1H472KZ	0.0047μF	4
C141~144	ECQM1H103KV	0.01μF	4
C145~152	ECQG1H102KZ	0.001μF	8
C153~156	ECQG1H102KZ	0.001μF	4
C157~160	ECQG1H222KZ	0.0022μF	4
C161	ECCR1H331J	330pF	1
C163, 164	ECCR1H331J	330pF	2
C166	ECCR1H331J	330pF	1
C167	ECEA0JKA101	100μF, 6.3V	1
C169	ECCR1H331J	330pF	1
C171	ECCR1H471J	470pF	1
C173	ECCR1H221J	220pF	1
C201~205	ECEA1HKA010	1μF, 50V	5
C206~212	ECQM1H103KV	0.01μF	7
C213, 214	ECEA1HKA010	1μF, 50V	2
C215, 216	ECQM1H103KV	0.01μF	2
C218	ECQG1H222KZ	0.0022μF	1
C219, 220	ECCR1H471J	470pF	2
C221	ECCR1H101J	100pF	1
C224	ECEA0JKA331	330μF, 6.3V	1
C225	ECQG1H222KZ	0.0022μF	1
C226, 227	ECCR1H471J	470pF	2
C228	ECCR1H101J	100pF	1
C231	ECQG1H472KZ	0.0047μF	1
C232, 233	ECCR1H471J	470pF	2
C234	ECCR1H101J	100pF	1
C235	ECQG1H332KZ	0.0033μF	1
C236, 237	ECCR1H471J	470pF	2
C238	ECCR1H101J	100pF	1
C240	ECQM1H103KV	0.01μF	1
C241	ECCR1H151J	150pF	1
C242	ECEA1HKN010	1μF, 50V	1
C244	ECQG1H682KZ	0.0068μF	1
C245	ECCR1H331J	330pF	1
C246	ECEA1HKN010	1μF, 50V	1
C247	ECEA0JKA470	47μF, 6.3V	1
C248	ECKR1E473ZV	0.047μF	1
C249	ECEA1EKA100	10μF, 25V	1
C250	ECEA1CKA470	47μF, 16V	1
C251	ECQG1H472KZ	0.0047μF	1
C252	ECEA1HKAR47	0.47μF, 50V	1
C253	ECRR1H104ZF	0.1μF	1
C254	ECQG1H102KZ	0.001μF	1
C255	ECQG1H332KZ	0.0033μF	1
C256	ECQV1H104JZ	0.1μF	1
C257	ECQG1H472KZ	0.0047μF	1
C263	ECEA0JKA470	47μF, 6.3V	1
C301	ECEA1CKA101	100μF, 16V	1
C302	ECEA1CU221	220μF, 16V	1
C303	ECEA1CKA101	100μF, 16V	1
C304	ECEA1CKA470	47μF, 16V	1
C305	ECEA1CU221	220μF, 16V	1
C306	ECEA1CKA470	47μF, 16V	1
C307	ECQV1H104JZ	0.1μF	1
C308	ECEA0JKA101	100μF, 6.3V	1
C309	ECEA1HKA010	1μF, 50V	1
C310	ECQB1H222JZ	0.0022μF	1
C311	ECEA0JKA331	330μF, 6.3V	1
C312	ECRR1H104ZF	0.1μF	1
C313	ECKR1E473ZV	0.047μF	1
C314	ECEA0JU102	1000μF, 6.3V	1
C315	ECQM1H103KV	0.01μF	1
C316	ECCR1H331J	330pF	1
C317	ECEA1EU101	100μF, 25V	1
C318	ECQV1H474JZ	0.47μF	1
C319	ECEA1HKA010	1μF, 50V	1
C320	ECEA0JKA101	100μF, 6.3V	1
C321	ECQB1H222JZ	0.0022μF	1
C322, 323	ECEA1CKA470	47μF, 16V	2
C324	ECEA1CU472	4700μF, 16V	1
C325	ECEA1CU102	1000μF, 16V	1
C326	ECQV1H104JZ	0.1μF	1
C327	ECEA1EKA100	10μF, 25V	1
C328	ECEA0JKA470	47μF, 6.3V	1
C329	ECKR1E473ZV	0.047μF	1
C330	ECRR1H104ZF	0.1μF	1
C331	ECKR1E473ZV	0.047μF	1
C332, 333	ECQB1H103JZ	0.01μF	2
C334	ECRR1H104ZF	0.1μF	1
C336~339	ECKR1E473ZV	0.047μF	4
C341	ECKR1E473ZV	0.047μF	1
C342	ECEA1AU332	3300μF, 10V	1
C400	ECBA1H470K	47pF	1

CP CONTROL PANEL CIRCUIT

Ref. No.	Part No.	Description	Per/Set
INTEGRATED CIRCUITS			
IC1	SVIGM603A121	Gate Array	1
IC2~4	SVIGM74LS07	Hex Buffers (O.C.)	3
TRANSISTORS			
Q1~4	2SA830SB		4
DIODES			
D1~43, 45~47, 49~53, 57~63, 65, 69~73	MA165TA5		64
D90~121, 126~129, 137, 141, 145, 149, 153, 157, 160, 161	SEL4117RM	LED (RED)	44
D122~125, 133	SEL4417GM	LED (GREEN)	5
DISPLAY			
LD1	LB603VF	Triple 8 Segments Display	1
COMPONENT COMBINATION			
Z1	EXBPI8103JM	10KΩ×8	1

Ref. No.	Part No.	Description	Per/Set
SWITCHES			
S1~42, 44~46, 48~52, 56~62, 64, 68~72	SSHG1049A	Push Switch	63
WIRING PART			
W5	QEXG02006RA	Wire	1
RESISTORS			
R1	ERDS2TJ184	180KΩ	1
R2	ERDS2TJ221	220Ω	1
R3	ERDS2TJ103	10KΩ	1
R4	ERDS2TJ152	1.5KΩ	1
R5	ERDS2TJ101	100Ω	1
R6~9	ERDS2TJ103	10KΩ	4
R10~13	ERDS2TJ152	1.5KΩ	4
R14~31	ERDS2TJ680	68Ω	18
CAPACITORS			
C1	ECRR1H104ZF	0.1μF	1
C2	ECCR1H101J	100pF	1
C3	ECEA1HKA010	1μF, 50V	1
C4	ECEA0JKS101	100μF, 6.3V	1
C5	ECCR1H101J	100pF	1
C6	ECRR1H104ZF	0.1μF	1
C8	ECRR1H104ZF	0.1μF	1

MKB1 MANUAL KEYBOARD 1 CIRCUIT

Ref. No.	Part No.	Description	Per/Set
INTEGRATED CIRCUIT			
IC1	MN50020PGV	Gate Array	1
DIODES			
S D1~86	MA162A	MA150IR (SUB. Part)	86
OSCILLATOR			
X1	EF0G08004A5	8MHz, Ceramic Oscillator	1
SWITCHES			
S1~7	SSPG7004A	Rubber Switch (7 pcs. on one)	1
S8~46	SSPG6004A	Rubber Switch (6 pcs. on one)	6

Ref. No.	Part No.	Description	Per/Set
RESISTORS			
R1	ERDS2TJ101	100Ω	1
R2	ERDS2TJ103	10KΩ	1
CAPACITORS			
C1	ECCR1H681J	680pF	1
C2	ECRR1H104ZF	0.1μF	1
C3	ECCR1H681J	680pF	1
C4	ECEA0JU470	47μF, 6.3V	1

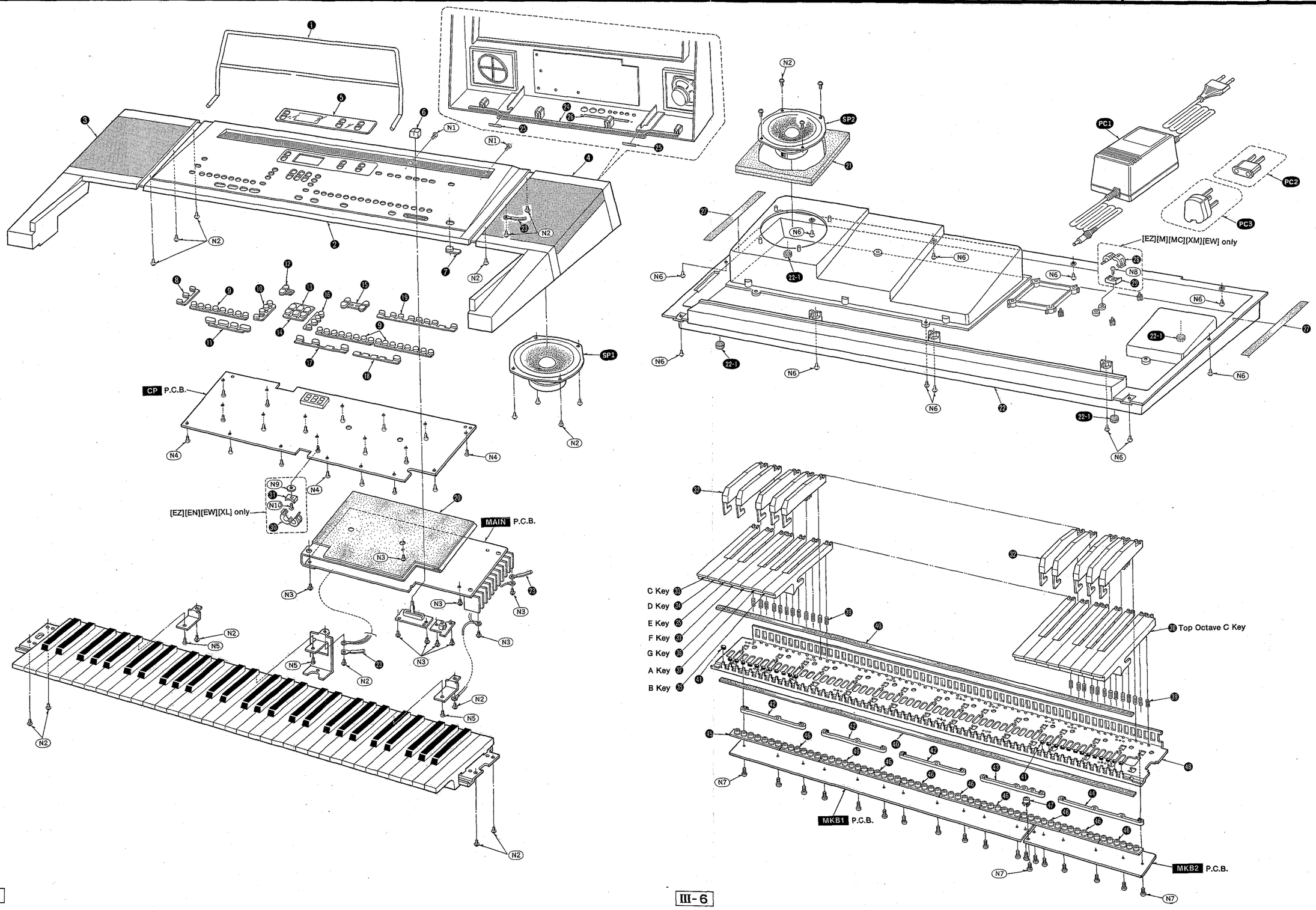
MKB2 MANUAL KEYBOARD 2 CIRCUIT

Ref. No.	Part No.	Description	Per/Set
DIODES			
S D1~36	MA162A	MA150IR (SUB. Part)	36
COMPONENT COMBINATION			
Z1	EXBP88332JM	3.3KΩ×8	1
SWITCHES			
S1~18	SSPG6004A	Rubber Switch (6 pcs. on one)	3

■ WIRING PARTS

Ref. No.	Part No.	Description	Per/Set
W1 EN EZ EW XL	SWKG1515SSA	Connector with Wire, [EN][EZ][EW][XL] only	1
W1	SWKG1510SSA	Connector with Wire, Other areas	1
W2	SWEG660A	Wire	1
W3	QEXG16006SSA	Connector with Wire	1
W4, 5	QEXG02006RA	Wire	2
W6	SWEG140A	Wire	1
W7 M XM MC EZ EW	QEXG04033ZB	Connector with Wire, [M][XM][MC][EZ][EW] only	1
W7	QEXG04028ZB	Connector with Wire, Other areas	1

EXPLODED VIEWS OF CABINET



REPLACEMENT PARTS LIST.....Cabinet and Chassis Parts

Notes:

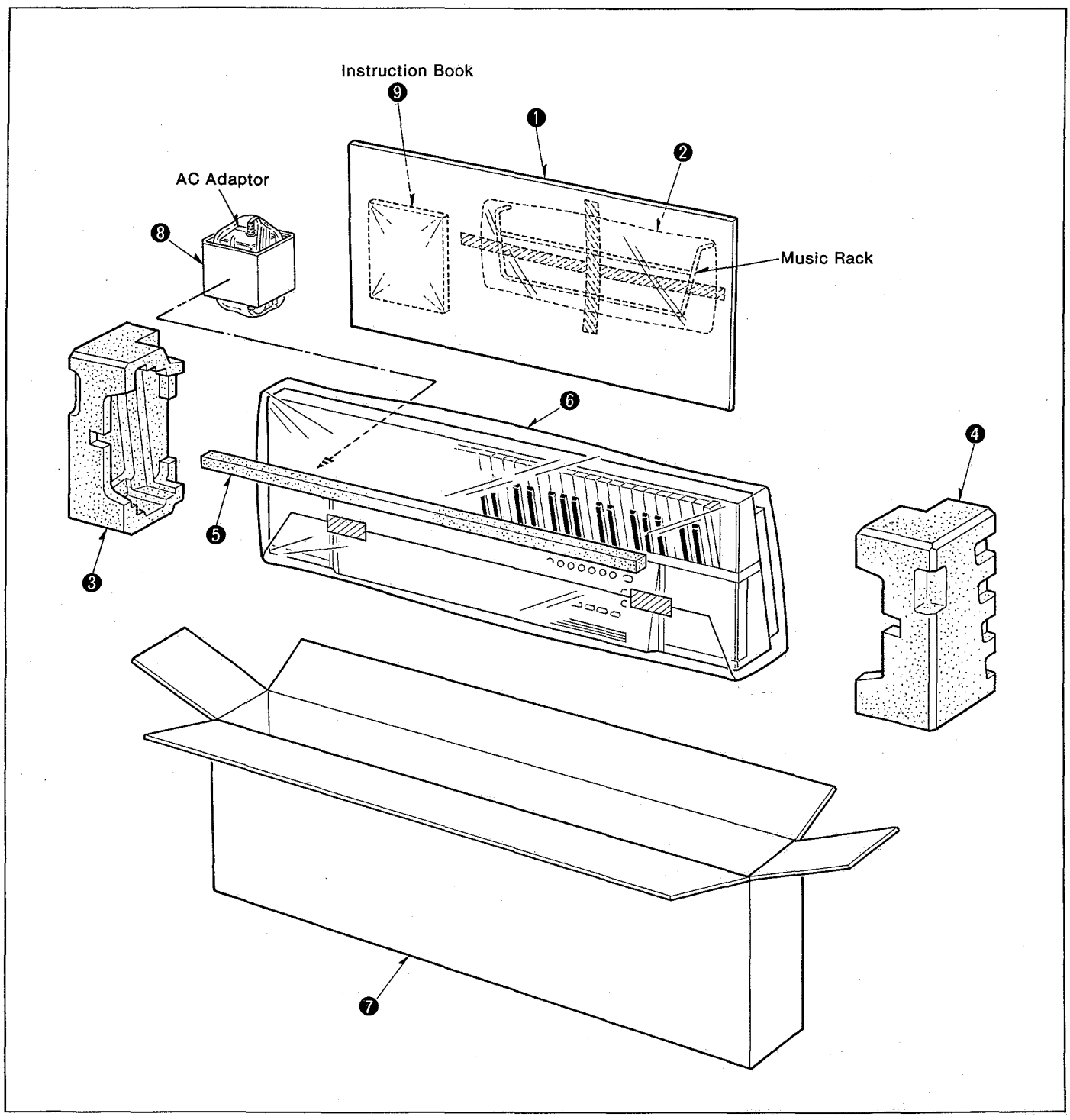
1. Important safety notice
   Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
2. ○ mark are new parts.
3. For part No. with area mark, check the area when placing an order.
4. Keyboard chassis part No. with mark (NLA) is no longer available after production discontinuation of the complete set.

■ CABINET & CHASSIS PARTS

Ref. No.	Part No.	Description	Per/Set
AC ADAPTOR			
PC1 XL XR ⚠	SAXG30A	AC Adaptor	1
PC1 MI MC ⚠ XM	SAXG20A	AC Adaptor	1
PC1 EK XS ⚠ XD	QFAG004AA	AC Adaptor	1
PC1 Others ⚠	SAXG50A	AC Adaptor	1
PC2 X ⚠	SJP5213-1	Attachment Plug, [X] only	1
PC3 XD ⚠	SJPG1350A	Power Plug, [XD] only	1
SPEAKER			
SP1, 2	EAS12P458A	Speaker, 12cm 3Ω	2
CABINET			
1	QGAG3001AA	Music Rack	1
○ 2	QGPG0013CA	Control Panel	1
○ 3	SYWG1883B	Speaker Grille , Left	1
○ 4	SYWG1884C	Speaker Grille , Right	1
○ 5	QKWG002AD	LED Display Plate	1
○ 6	SBNG7050C	Knob, Main Volume	1
○ 7	QGUG1056AB	Button A	1
○ 8	QGUG1057AB	Button B	1
9	QGUG1042AA	Button C	3
○ 10	QGUG1043CB	Button D	1
○ 11	QGUG1048AB	Button E	1
12	QGUG1045AA	Button F	1
○ 13	QGUG1047BB	Button G	1
○ 14	QGUG1047CB	Button H	1
15	QGUG1046AA	Button I	1
○ 16	QGUG1044BB	Button J	1
○ 17	QGUG1049BB	Button K	1
○ 18	QGUG1051AB	Button L	1
○ 19	QGUG1053BB	Button M	1
20	QSCG018B	Shield Cover	1
21	QMRG5003AA	Air Shield Packing	1
○ 22	QYKG026MA	Bottom Plate	1
22-1	SHGG3130A	Foot Rubber	4
23	TUX926	Binder	3
24	SHSG3150A	Felt	1
25	SHSG6170A	Felt	2
26	SHSG4940A	Felt	1
27	SHSG6130A	Felt	2
28 EZ MI MC	QLZG001A	Core	1
29 XM EW	SHRG1270A	Mounting Base	1
30 EN EZ	SLQGTRCC20	Core	1
31 EW XL	SHRG1270A	Mounting Base	1

Ref. No.	Part No.	Description	Per/Set
MANUAL KEYBOARD			
32	STBG2070A	Black Key	25
33	STBG1100A	White Key (C and F Keys)	10
34	STBG1110A	White Key (D key)	5
35	STBG1120A	White Key (E and B Keys)	10
36	STBG1130A	White Key (G Key)	5
37	STBG1140A	White Key (A Key)	5
38	STBG1150A	White Key (Top Octave C Key)	1
39	SUSG270A	Spring	61
40	SHSG1970A	Felt	2
41	SHGG9050A	Key Guide Rubber	61
42	SHRGA9010A	Spacer	3
43	SHRGA9020A	Spacer	1
44	SHRGA9030A	Spacer	1
45	SSPG7004A	Rubber Switch (7 pcs. on one)	1
46	SSPG6004A	Rubber Switch (6 pcs. on one)	9
47	SHRG9760A	Spacer	1
48	STBG6241A	Chassis	1
SCREW			
N1	QHDG011AA	Screw	2
N2	XTW3+12Q	Screw	21
N3	XTV3+12G	Screw	9
N4	XTW3+10Q	Screw	19
N5	XTB3+5C	Screw	3
N6	XTW3+14TFZ	Screw	12
N7	XTW+10T	Screw	19
N8	XTV3+10G	Screw	1
N9	QHWG004AA	Washer (Insulator)	1
N10	XTV3+12G	Screw	1

PACKING



■ PACKING PARTS

Ref. No.	Part No.	Description	Per/Set
1	QPGG0061AA	Cardboard	1
2	QPHG017AA	Polyethylene Bag	1
3	SPNG5675B	Pad	1
4	SPNG5676B	Pad	1
5	QPNG0104AA	Pad	1
6	SPHG1750A	Polyethylene Bag	1
○ 7	QPGG0113AA	Carton	1
8	QPGG0062AA	AC Adaptor Case	1

Ref. No.	Part No.	Description	Per/Set
INSTRUCTION BOOK			
9 M	QQFGKN220DA	Instruction Book	1
9 EZ EA	QQFGKN220CA	Instruction Book	1
9 EH EF	QQFGKN220FA	Instruction Book	1
9 EW	QQFGKN220GA	Instruction Book	1
9 EN	QQFGKN220AA	Instruction Book	1
9 Others	QQFGKN220BA	Instruction Book	1